REPORT

PRELIMINARY (35%) REMEDIAL DESIGN REPORT

OPERABLE UNIT 1 – PHASE 1 REMEDIAL ACTION

MARTIN AARON SUPERFUND SITE

CAMDEN, NEW JERSEY

Submitted To: Martin Aaron Superfund Site Settling Performing Defendants

Submitted By: Golder Associates Inc.
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September 2013 **Project No.: 073-86114**

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September 27, 2013

Via Electronic Mail and US Mail

Ms. Kathryn Flynn
Remedial Project Manager
New Jersey Remediation Branch
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007-1866

RE: Martin Aaron Superfund Site

- **Preliminary (35%) Remedial Design Report**
- **Proposed Interim Discussion Meetings**

Dear Ms. Flynn,

Enclosed please find for review and consideration by the United States Environmental Protection Agency (USEPA) the Preliminary (35%) Remedial Design Report (35% RD Report) prepared by Golder Associates (Golder) on behalf of the Martin Aaron OU-1 Performing Parties (Group). Hard-copies of this report will be provided to you early next week. Further, as previously discussed, the report providing the results of the recent Ponte building structural assessment (Appendix A-3 of the 35% RD Report) will be provided under separate cover next week.

This 35% RD Report was prepared in accordance with Section VI.10.e of the Consent Decree, Sections VII.A and VII.B of the Statement of Work (SOW), and the USEPA-approved Remedial Design Work Plan (Golder, 2008). In accordance with these documents, this 35% RD Report provides the results of preliminary design activities including, but not limited to, discussions of design criteria and objectives, design analyses, and detailed discussion of the planned remedial approach as well as associated challenges and constraints.

As presented in the recently-submitted Pre-Design Investigation (PDI) Report, and as we have discussed during our meetings over the past year, the Conceptual Site Model (CSM) has changed significantly since the Record of Decision as a result of the Stage I and Stage II PDI results. As such, we believe it would be beneficial to have interim design meetings with USEPA/USACE as the 95% RD Report is being prepared so that Site conditions and design requirements are adequately addressed.

We look forward to our upcoming November 5 meeting at Golder's office. An agenda outlining proposed discussion topics will be will be provided to USEPA and USACE for review in advance of that meeting.

In the interim, if you have any questions or preliminary comments, please feel free to contact me at 610-435-1151.

Sincerely,

de maximis, inc.

Geoffrey C. Seibel
Project Coordinator

CC: John Prince, USEPA (w/o Enclosure)
Martin Aaron Site Technical Committee
Michael Borda, Ph.D., Golder Associates
Lori Vollnick, USACE

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1.0 INTRODUCTION

This Preliminary (35%) Remedial Design Report (35% Design) was prepared on behalf of the Martin Aaron Superfund Site Settling Performing Defendants (Group) by Golder Associates Inc. (Golder) for the Martin Aaron Superfund Site (Site) Operable Unit 1 (OU1) Phase 1 Remedial Action (Phase 1 RA). The Site is located in the City of Camden, Camden County, New Jersey.

On September 30, 2005, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) for OU1 that identified the selected remedy to address impacts to Site soil and groundwater associated primarily with volatile organic compounds (VOCs) and arsenic (USEPA, 2005). More specifically, the ROD identified soil with a Total Volatile Organic Compound (TVOC) concentration greater than 1 milligram per kilogram (mg/kg) and soil with arsenic concentrations greater than 300 mg/kg as representing a source of groundwater contamination. For the purpose of this 35% Design, the terms VOC Source Material, White Material or Arsenic-contain Material refers to any subsurface material that exceeds these criteria and are further described in Section 1.2. The ROD also identified direct-contact cleanup goals for soil.

In the ROD, the USEPA separated the remedial action into two phases - Phase 1 RA and Phase 2 RA. The Phase 1 RA covers the soil remedy, limited groundwater monitoring following the soil remedy, and establishment of certain institutional and engineering controls for the Site. A Consent Decree, entered in August, 2008, addresses the design and implementation of the Phase 1 RA by the Group. The Phase 2 RA will address groundwater quality and migration of contaminates in groundwater.

This 35% Design has been prepared in accordance with Section VI.10.e of the Consent Decree; Sections VII.A and VII.B of the Statement of Work (SOW), and the EPA-approved Remedial Design Work Plan (RDWP) for the Site (Golder, 2008).

1.1 Purpose of the Preliminary Remedial Design Report

As described in Section VII of the SOW, each remedial design report for the Site shall include, to the extent work has been performed, the following design-related items:

- Discussion of the design criteria and objectives;
- Discussion of the capacity and ability to meet design objectives successfully;
- Plans and specifications;
- Design analysis, including supporting calculations and documentation of how the plans and specifications will meet the remedial design requirements;
- A technical specification for photographic documentation of the remedial construction work;
- A discussion of the manner in which the remedial action will achieve the Performance Standards;

- A plan for establishing institutional controls (i.e., deed notices and/or other deed restrictions, and Classification Exception Area); and,
- A draft schedule for remedial action activities and a preliminary schedule for operation and maintenance activities.

The preliminary design of the various elements for the remedy presented in this report, and USEPA comments on the preliminary design, will serve as the basis for development of the final design for the Phase 1 RA by the Group. Future remedial design reports will continue to expand upon the details and completeness of the design, and include:

- A Pre-Final (95%) Remedial Design Report (95% Design) representing approximately 95% of the overall design effort; and
- A Final (100%) Remedial Design Report (100% Design) incorporating USEPA comments on the 95% Design.

1.2 Material Descriptions for Design

For design purposes it is helpful to describe materials that will be excavated and either reused on-site as backfill or disposed of off-site. Descriptions of these materials follow:

- Overburden – fill material that includes Historic Fill, concrete slabs, brick, debris, and other fill materials with no detected contaminants of concern (COC) concentrations above the Source Area Cleanup Goals, listed in Appendix II, Table 6 in the ROD. This material will be excavated and retained on-site for use as backfill;
- VOC Source Material – consists of Overburden with total detected VOC COC concentrations greater than 1 mg/kg. This material will be excavated and disposed of off-site;
- Arsenic Source Material – consists of White Material which was observed during the PDI to encompass a range of visually distinguishing colors including white, green, tan, blue, and black. White Material is also identifiable by its distinct odor and textures that are unlike natural soil materials, ranging from soft and paste-like, to hard and abrasive. Hereinafter, Arsenic Source Material is referred to as “White Material”. This material will be excavated and disposed of off-site; and,
- Arsenic-containing MMC – consists of Meadow Mat Complex (MMC) with arsenic concentrations greater than 300 mg/kg. This material is not considered an arsenic source material because, based on pre-design investigation findings (Golder, 2013), it is a repository for arsenic that has leached from the overlying White Material. Nonetheless, in compliance with the ROD, this material will be excavated and disposed of off-site.

1.3 Report Organization

This 35% Design has been organized into nine primary sections, which are summarized as follows:

Section 1.0 Introduction – presents the purpose and organization of the 35% Design;

Section 2.0 Background Information – provides a brief description of the Site and its history, regulatory background, list of remedial action objectives, and the Performance Standards;

Section 3.0 Remedial Design Activities – summarizes activities completed to develop the 35% Design, including pre-design work completed by the Group, and presents the preliminary remedial design including descriptions of how the design components will achieve the remedial action objectives and the Performance Standards presented in the ROD and Consent Decree;

Section 4.0 Remedial Action Plans – describes plans required to complete the Phase 1 RA and will be developed during the 95% Design;

Section 5.0 Permit Equivalences and Approvals – presents preliminary lists of anticipated permit equivalencies and approvals required to complete the Phase 1 RA, including those for which applications will be prepared during the 95% Design;

Section 6.0 Other Project Considerations – describes additional considerations related to the implementation of the Phase 1 RA and mitigating impacts of the implementation on the surrounding neighborhood;

Section 7.0 Preliminary Project Schedule – presents an updated project schedule that includes a preliminary schedule for remedial action activities;

Section 8.0 Pre-Final (95%) Remedial Design Requirements – describes considerations for progressing the preliminary design to the 95% Design level including design refinements, development of additional design drawings and technical specifications, material management considerations, and review requirements; and,

Section 9.0 References – cites references used in preparation of this 35% Design.

2.0 BACKGROUND INFORMATION

2.1 Site Description

Section IV of the Consent Decree defines the Site as including the following properties on the tax map of Camden County for the City of Camden:

- Block 460, Lot 1 (Martin Aaron Property) – a property used since 1968 by various companies, including the last recorded owner, Martin Aaron, Inc., and prior to that a variety of business associated with and including leather tanneries;
- Block 460, Lots 2 and 4 (Scrapyard Property) - a scrapyard north of the Martin Aaron Property situated between South Broadway and South 6th Street on Everett Street, which included a vacant brick building (formerly a bakery) that was destroyed by fire in August 2008, and owned by Mr. George P. Ackerle and Ms. Calogera C. Ackerle;
- Block 460, Lots 3 and 26 (Comarco Property) - an active food-processing plant located at 501 Jackson Street, south of the Martin Aaron Property, and owned by Mr. Thomas Hoversen and Ms. Karen G. Hoversen;
- Block 460, Lot 29 (Ponte Equities Property) - an unused warehouse located south of the Martin Aaron Property on South 6th Street, and owned by Ponte Equities, Inc.; and,
- Various adjacent right-of-way locations, including the areas between the above named properties and South Broadway, South 6th, Jackson, and Everett Streets.

All properties that constitute the Site are zoned for commercial/industrial use. As described in the ROD, residential re-use of the Site is not contemplated and will be further restricted with the recording of certain institutional controls.

The Site is situated on relatively level but uneven land in an area consisting largely of mixed commercial-industrial and some residential properties. Access to the Site is restricted by a chain-link fence with four locked gates – one along South Broadway, one along Everett Street, and two along South 6th Street. The general layout of the Site and existing surface conditions are shown on Drawing 1. The Site encompasses approximately 6.5 acres, and includes an area defined as the “Limits of Soil Remediation” in the Consent Decree (Drawings 1 and 2).

The Group is required to implement the Phase 1 RA within the Limits of Soil Remediation. Pursuant to Section IV of the Consent Decree, the term “Limits of Soil Remediation” specifically excludes:

- The area beneath the three-story brick building currently existing on Block 460, Lot 29 (the Ponte Equities Property), including demolition of that building, subsurface soils remediation under that building, and any investigation or remediation within that building;
- The area beneath the building currently existing on Block 460, Lot 4 (portion of the Scrapyard Property), including demolition of that building, subsurface soils remediation under that building, and any investigation or remediation within that building; and,
- The area beneath the buildings currently existing on Block 460, Lots 3 and 26 (the Comarco Property), including investigation of any soil contamination beneath these buildings or the subsurface soils remediation under these buildings.

As such, these excluded areas will not be considered in the remedial design. The Limits of Soil Remediation and the Excluded Areas are shown on Drawing 2.

2.2 Geologic Setting

Historic topographic maps (e.g., U.S.G.S 1891, see Cover Sheet of Drawing Package) show that prior to and during industrial development, a large portion of the area of the City of Camden encompassing the Site was drained by a tidal embayment that opened into the Delaware River. During the latter part of the 1800s and into the early 1900s, many of these tidal embayments were filled with assorted materials, including dredge materials from the Delaware River to build land for industrial/commercial expansion. By 1898, the available historic topographic maps show that the embayment encompassing the Site had been filled (Cover Sheet of Drawing Package).

Consistent with the available documentation and historical maps, the Site is underlain by Historic Fill placed on the former natural estuarine deposits, referred to as the MMC in connection with the Site, to allow land development. The estuarine deposits comprise a widely recognized geologic unit in New Jersey known to have formed when large areas of New Jersey were tidal embayments to rivers and water bodies, such as the Delaware River. The estuarine deposits are defined by highly organic layers consisting of reeds, roots, and wood matter interbedded with a glauconitic[1] silt and clay horizon. From a depositional standpoint, the reeds, roots, and wood matter represent the former foliage present in a cedar-type wetland environment that would be tidally inundated with water. Fine-grained natural materials would be trapped in the root and vegetation mass creating the glauconitic silt and clay horizon that sits above the present-day peat material.

The geologic units identified as being related to surficial and near surface materials, from youngest (top) to oldest (deeper) are as follows:

- Historic Fill[2];
- MMC;
- Cape May Formation;
- Semi-Confining Unit (possible relic of Merchantville-Woodbury Confining Unit); and,
- Magothy Formation.

[1] Glauconite is a dull green earthy or granular mineral of the mica group. It occurs abundantly in greensands, and is believed to form during periods of very slow sedimentation. It is among the most common sedimentary iron silicates. Bates and Johnson, Glossary of Geology, Third Edition. American Geological Institute. 1987.

[2] For purposes of this Site, "Historic Fill" is defined as material used to raise or level topographic grade and/or improve ground conditions for structure support and consists of gravel, sand, fines, glass, ash, and cinders in varying constituent percentages and distribution, and also includes the construction and demolition debris encountered at the Site. For more information, see the Pre-Design Investigation Report (Golder, 2013).

Greater detail concerning contact depths, thicknesses, and hydrogeological and geotechnical engineering characteristics of these units is discussed in the *Pre-Design Investigation Report* (PDI Report) (Golder, 2013).

The tidal embayments drained to the Delaware River. Drainage was typically through a series of natural channels which cut down into the wetland bottom. One such channel is likely what would become the Line Ditch that ran in an east-west orientation through the northern portion of the Site as shown by historic topographic maps (U.S.G.S. 1891) and Sanborn Maps (1906). Information from the Camden Historical Society suggests that the Line Ditch (a.k.a., Liney Ditch, Little Newton Creek, and Kaighn's Run) was a stream that originated about a half-mile northeast of the Site and flowed toward the Delaware River under South Broadway, and, like the former embayment, was filled as the city developed. The buried channel of the former Line Ditch represents a zone of increased shallow groundwater flow, which is of significance with respect to management of groundwater during implementation of the remedy. Further discussion of the relic Line Ditch is provided in the PDI Report (Golder, 2013).

2.3 Site History

Historical records reflect that the properties within the Site have been used for industrial activities as early as 1886. From 1887 to 1908, a majority of the Site was used as a tannery by Kifferly Morocco Manufacturing Company, which specialized in the tanning and glazing of hides and leathers. During that time period, the tannery tripled in size. Other properties within the Site were occupied by industries operating in concert with the tannery, such as a slaughterhouse and leather shoemaker.

In 1908, a portion of the Site was purchased by the Castle Kid Company and was used to produce mat and glazed kid (i.e., goatskin, lambskin or similar soft leathers). By 1921, the Castle Kid Company facility had developed into a large scale manufacturing complex. Facility expansion included a substantial amount of building construction and the addition of a railroad spur. Expansion of the tannery included the construction and use of the buildings on the current Ponte Equities Property, including the existing three-story building. By 1926, however, the tannery facility was noticeably downsized.

In 1940, following cessation of tannery operations, the property owned by Castle Kid Company was seized by the City of Camden due to tax delinquency. A portion of the property owned by Castle Kid Company, which comprises the current Martin Aaron Property, was sold to Benjamin Schmerling in 1940. A three-story warehouse located at the southwest corner of the Benjamin Schmerling property was leased to H. Preston Lowden Company (Preston), which operated a hair-and-wool blending business.

Martin Aaron, Inc. (Martin Aaron) purchased its property from Benjamin Schmerling in 1968, and is the last owner of record. From 1968 to 1987, Martin Aaron operated a drum recycling business on its property. In 1985, Drum Service of Camden, a joint venture, began operating on the property. In or about 1986, the joint venture purportedly dissolved, and Drum Service of Camden continued drum recycling operations as a DBA for Westfall Ace Drum Company (WADCO). Rhodes Drum Inc. (Rhodes Drum) also operated at the Site from approximately 1985 until it ceased business in 1998. WADCO occupied the main Site building (Martin Aaron Building), while Rhodes Drum operated from a smaller building in the southeast corner of the Martin Aaron Property (Rhodes Drum Building). WADCO was liquidated in bankruptcy proceedings in 1994.

Ownership of the portion of the property owned by Castle Kid Company, and comprising the current Ponte Equities Property, is not clear after seizure by the City of Camden. However, it appears to have been subdivided into the current parcel containing the former Castle Kid Company main factory (circa 1926, which corresponds to the current three-story Ponte Equities Building) and a portion of the Castle Kid Company beam house (circa 1926, which also corresponds to the demolished one-story Ponte Equities Building). American Chain and Cable Company - Pennsylvania Lawn Mower Division occupied this subdivided portion of the former Castle Kid Company property circa 1950, and Haddon Bindery circa 1982.

2.4 Site Regulatory Background

The New Jersey Department of Environmental Protection (NJDEP) conducted several interim remedial measures from 1995 to 1999 at the Site. NJDEP removed soil, approximately 700 drums of chemical wastes, 10,000 empty drums, dumpsters filled with mixed wastes, several underground storage tanks (USTs), and several basins used for the discharge of drum residue, rinsate runoff, steam blowdown, and other wastes. In May 1997, NJDEP initiated a Remedial Investigation/Remedial Alternatives Analysis (NJDEP RI) to determine the nature and extent of residual constituents in soil and groundwater associated with the former Martin Aaron operations. In 1998, concurrent with the NJDEP's activities, the City of Camden demolished the superstructure of the Martin Aaron Building (the main building used for drum reconditioning operations) as it was in danger of collapsing. The Site was placed on the USEPA National Priorities List (NPL) on August 23, 1999, while the NJDEP RI activities were underway. Upon completion of the NJDEP's RI in June 2000, the USEPA became the lead agency for the Site.

The USEPA undertook additional removal actions, ending in 2001, to remove contaminated soil, USTs, above ground tanks, piping, and process equipment. USEPA also removed 68 drums of hazardous waste, several hundred empty drums, several buried drums, and debris from the vicinity of the former Rhodes Drums Building. The USEPA determined that additional characterization of the Site was required, and completed its Remedial Investigation/Feasibility Study (USEPA RI/FS) in June 2005. The results of the USEPA RI are described in the *Remedial Investigation Report* dated December 2004 (CH2MHill, 2004), and the results of the USEPA FS are described in the *Draft Final Feasibility Study Report* dated July 2005 (CH2MHill, 2005).

On August 12, 2005, the USEPA published its Proposed Remedial Action Plan (PRAP) for the Site (USEPA, 2005). The USEPA provided an opportunity for written and oral comments from the public on the PRAP. Following review of public comments, the USEPA's decision on the remedial action was embodied in the ROD, executed on September 30, 2005 (USEPA, 2005a). NJDEP concurred with the ROD in a letter dated September 29, 2005 (NJDEP, 2005).

Subsequently, from December 2005 to January 2006, the USEPA conducted a two-phased assessment concentrating on the Ponte Equities Property portion of the Site. The Ponte Equities Property was not included in the remedial investigation that led to USEPA's selected remedy. The results of the additional assessment are described in *Soil Investigation of the Ponte Equities Site* dated May 2006 (Lockheed Martin, 2006), and *Final Sampling and Analysis Report, Surface Soil and Building Interior Sampling, Ponte Equities Site* dated March 2006 (Weston Solutions, 2006).

2.5 Site Remedial Action Objectives

The ROD sets forth seven Remedial Action Objectives (RAOs) for the Site. These specific objectives to protect human health and the environment are based on available information and standards included in applicable or relevant and appropriate requirements (ARARs), and on the risk-based levels established in the USEPA risk assessment.

The design for the Phase 1 RA will address the following four RAOs as set forth in the SOW (USDOJ, 2007):

- Reduce or eliminate the direct contact threat associated with contaminated soil to levels protective of a commercial or industrial use and protective of the environment;
- Prevent erosion and off-site transport of contaminated soils;
- Reduce or eliminate the migration of Site contaminants from soil to groundwater and surface waters; and,
- Prevent public exposure to contaminated groundwater that presents a significant risk to human health and the environment.

The remaining three RAOs will be addressed during the Phase 2 RA:

- Minimize or eliminate organic vapor migration from groundwater into future indoor environments that may be built on the Site;
- Remediate groundwater to the extent practicable and minimize further migration of contaminants in groundwater; and,
- Restore groundwater to drinking water standards within a reasonable timeframe.

2.6 Performance Standards

Within the Limits of Soil Remediation, the Phase 1 RA will be designed to meet the requirements of the RAOs that include the Source Area and direct-contact cleanup goals for soil listed in Table 6 of Appendix II to the ROD. Additionally, the Phase 1 RA will be designed to achieve compliance with the chemical- and action-specific ARARs identified in Table 10 of Appendix II to the ROD applicable to the Phase 1 RA. These include requirements promulgated under:

- Clean Air Act (related to dust emissions and controls during source removal);
- Resource Conservation and Recovery Act (RCRA) (portions related to the generation and off-site disposal of hazardous waste);
- New Jersey Technical Requirements for Site Remediation (N.J.A.C. 7-26E et seq.);
- New Jersey Flood Hazard Control Act (soil remediation and capping will occur within the 100-year floodplain);
- Clean Water Act National Pretreatment Standards) as they apply to local POTW acceptance of excavation dewatering effluent);
- Occupational Safety and Health Act (remediation worker protection); and,
- N.J.A.C. 7:14A-7.5(b)3vi (authorization of discharges to groundwater for dewatering at a contaminated site, in connection with discharges generated as part of the depressurization of the Cape May Formation, necessary to maintain excavation stability).

3.0 REMEDIAL DESIGN ACTIVITIES

3.1 General Requirements

In order to meet the RAOs for Phase 1 RA of the Site listed in Section 2.5 above, Section IV of the SOW (USDOJ, 2007) lists a number of design-related tasks to be performed:

- Conduct soil sampling within the Limits of Soil Remediation (completed during the PDI) to characterize the extent of contaminated material therein that needs to be removed or capped to satisfy the remedial action objectives and the Performance Standards. The sampling shall include areas within the Limits of Soil Remediation adjacent to the three-story Ponte Equities Building, adjacent to the buildings on the Comarco Property, and adjacent to the building on the Scrapyard Property, along with the other areas within the Limits of Soil Remediation. The sampling will include testing for Resource Conservation and Recovery Act (RCRA)-characteristic wastes, as well as contaminants for which the USEPA has established cleanup goals in the ROD;
- Develop plans and specifications for the demolition of the Rhodes Drum Building on the Martin Aaron Property and the one-story building on the Ponte Equities Property and any structure attached thereto other than the three-story building on the Ponte Equities Property, including the disposal of any material therefrom;
- Conduct an evaluation of what measures are necessary, if any, to assure that excavation will not adversely affect the structural integrity of the three-story building on the Ponte Equities Property, the buildings on the Comarco Property, and the building on the Scrapyard Property;
- Develop plans and specifications to excavate contaminated surface and subsurface soils within the Limits of Soil Remediation which exceed cleanup goals specified in the ROD;
- Develop plans and specifications to transport excavated soil to an off-site facility for disposal. Plans should anticipate shipment of RCRA-characteristic waste to a RCRA facility when encountered;
- Develop plans and specifications to backfill excavated areas;
- Develop plans and specifications for site preparation and placement of a cap within the Limits of Soil Remediation over the areas that exceed one or more of the direct contact cleanup goals listed in the ROD;
- Develop plans and specifications for the performance of air monitoring during construction/remedial activities at the Site to ensure that air emissions resulting from the activities meet applicable or relevant and appropriate air emission requirements; and,
- Develop plans to implement institutional controls that will protect future Site users from contamination left on-site, including deed notices and a Classification Exception Area (CEA).

The remainder of this report discusses the status of these remedial design activities pursuant to achieving the RAOs.

3.2 Summary of Stage I and II Pre-Design Investigations

3.2.1 Overview

In order to design a remedy that achieves the RAOs, it was necessary to further define the lateral and vertical extent of the arsenic and VOC Source Areas identified by the USEPA RI, as well as establish the appropriate limits of a cap for the Site to address the direct contact risk. In accordance with the SOW, Golder prepared a RDWP that included the PDI Work Plan; Quality Assurance/Quality Control Project Plan (QAPP); and, Health and Safety Contingency Plan (HSCP). The RDWP was initially submitted to the USEPA on February 28, 2008, and was subsequently revised to address comments received from USEPA on April 21, 2008 and June 9, 2008. The revised RDWP was resubmitted in August 2008 (Golder, 2008). The USEPA approved the August 2008 RDWP, and by inclusion the PDI Work Plan, QAPP, and HSCP, by letter dated January 29, 2009.

The USEPA-approved PDI Work Plan proposed to collect design-related information for the Site in two stages, with the scope of Stage II PDI to be developed, in coordination with USEPA, based on the findings of the Stage I PDI. The PDI Work Plan outlined specific goals for the Stage I PDI relevant to collection of groundwater, Source Material delineation, and geotechnical engineering information. The primary Stage I PDI was performed between 2008 and 2009 with supplemental activities conducted into 2010.

The findings of the Stage I PDI resulted in significant changes to the Conceptual Site Model (CSM) as described in the USEPA RI/FS (CH2MHill, 2004/2005) and incorporated into the ROD. These changes were discussed and presented to USEPA in October 2009; and thereafter, in connection with the MMC arsenic stratification and natural attenuation studies and reporting. The key findings are summarized in Section 3.2.2. A scope of work for the Stage II PDI was submitted to USEPA in a Technical Memorandum dated August 22, 2012 (Golder 2012). The objectives of the Stage II PDI (which incorporated the new CSM) were stated as follows:

- Delineate the extent of soil that exceed the cleanup goals established in the ROD Source Area Cleanup Goals (ROD Appendix II, Table 6);
- Better understand the relationship between the various types of subsurface materials that exceed the arsenic source area cleanup goal;
- Evaluate the geotechnical, shallow groundwater, residual infrastructure (i.e., old foundations, subsurface concrete slabs and pipes) and other Site subsurface conditions that must be addressed during design to complete excavations; and,
- Obtain the field data needed to prepare the remedial design.

The USEPA approved the scope of work for the Stage II PDI in December 2012 and the Stage II PDI was performed between 2012 and 2013.

3.2.2 Key Findings

The SOW indicates the 35% Design should include a discussion and evaluation of pre-design investigation activities. However, with the concurrence of USEPA, the findings of the Stage I and Stage II Pre-Design Investigation programs were instead reported in the PDI Report (Golder, 2013). The following summarizes the key findings of the Stage I and Stage II Pre-Design Investigations that are relevant to the design:

- Subsurface conditions, including geology and hydrogeology are significantly different and more complex than previously identified:
  - A distinct and relatively wide-spread layer of material containing arsenic greater than 300 mg/kg (White Material) was discovered;
  - Widespread, but not continuous, existence of a naturally-occurring, generally fine-grained, highly organic, MMC, typical for this part of New Jersey, beneath the Overburden and White Material was confirmed;
  - Multiple hydrostratigraphic units exist at the Site including, from shallowest to deepest, a shallow groundwater unit within the Overburden above the MMC, a semi-confined unit directly below the MMC within the Cape May Formation, and the regionally important Upper Potomac-Raritan-Magothy (UPRM) aquifer system below the Cape May Formation;
  - Cape May Formation underlying the Site has been shown to be a prolific, highly transmissive semi-confined aquifer unit;
- Extensive buried and often massive infrastructure has been discovered at the Site including masonry and stone foundation walls and supporting concrete footings; demolition debris-filled basements; thick monolithic foundations; an apparent timber low-deck structure[3]; an approximately 42-inch diameter sewer pipe (large diameter pipe); and, various piping and conduits scattered throughout the Limits of Soil Remediation;
- The distribution of arsenic impacts at the Site is significantly different and often more complex than presented previously:
  - Overburden, with the exception of 6 isolated locations, has arsenic concentrations of less than 300 milligrams per kilogram (mg/kg) and does not represent a source of arsenic on the Site;
  - White Material, which is the primary source of arsenic, is distributed over a large area of the Site and typically below the Overburden and buried structures, except was encountered on top of the low-deck structure;
  - The MMC is a widely recognized unit in Coastal Plain settings and in New Jersey, and previous studies elsewhere have established that it has a very high capacity to bind many metals. Studies performed during the PDI and previously shared with USEPA demonstrate that arsenic is being sequestered - i.e., bound within the MMC in an immobile form. This process, by its nature, will increase concentrations of certain metals within the MMC, and has resulted in diminishing concentration of arsenic with depth within the MMC - i.e., exceedances of 300 mg/kg are located in the uppermost horizon of this unit. Therefore, while arsenic greater than 300 mg/kg was encountered, the MMC is not a source material;

[3] A common waterfront construction technique where a pile-supported deck structure is constructed above soft sediments and the water surface to support structures at higher grade

- Arsenic does not exceed 300 mg/kg in the Cape May Formation below the MMC;
- Shallow groundwater above the MMC and in contact with White Material has elevated arsenic concentrations ranging from 4,110 micrograms per liter (µg/L) to 16,300 µg/L;
- The RI/FS originally characterized the UPRM groundwater as being substantially contaminated with arsenic and other metals. Subsequent sampling has determined that arsenic levels range from non-detect (Reporting Limit of 0.95 µg/L) to 124.0 µg/L with an average arsenic concentration in the UPRM groundwater of 12.8 µg/L. This average arsenic groundwater concentration in the UPRM is approximately 400 times lower than arsenic concentrations in the overlying shallow groundwater above the MMC (average arsenic concentration is 7,518 µg/L). Fifteen wells are screened in the UPRM and of them, four reported arsenic exceedances above the Maximum Contaminant Level (MCL) of 10 µg/L;

- Areal and vertical distribution of the VOC Source Areas is generally similar to that presented in the USEPA RI and limited primarily to three areas within fill; and,
- Groundwater impacts from VOCs (primarily chlorinated ethenes) are limited to on-site groundwater. The presence of predominantly reductive dechlorination daughter products (e.g., cis-1,2-dichloroethene) confirms that natural attenuation via reductive dechlorination of these compounds is occurring.

In the context of the remedial design, the findings above result in the identification of a number of key engineering design considerations:

- Buried Structures (further detailed in Section 3.4.2)
  - Extensive remains of remnant structures exist at and below grade in areas where Source Material removal is necessary at depth below the remnant structures. Those structures not only impede removal of Source Materials, they also complicate the design and installation of excavation support (i.e., sheet piling cannot be driven through the structures). Locally, they can perch surface water, reduce infiltration, and influence and interrupt the shallow water flow in the Overburden. Therefore, they will need to be removed where they impede Source Material removal;
- Protection of on-site Structures and Roadways (further detailed in Section 3.4.5.3)
  - Buildings and roadways near planned excavations must be protected, and the proximity and poor conditions of some on-site structures constrain the methods and extent of source removal in some limited locations;
- Utilities (further detailed in Section 3.4.5.3)
  - Overhead and underground utilities near excavation areas must be protected. Along South 6th Street, important utility corridors critical to the surrounding area overlie a small volume of White Material, and cannot be protected without relocation, thereby limiting the practical extent of the excavation footprint;
- Material Management (further detailed in Section 3.4.6)
  - Large areal extent of Source Materials results in less space available to support remediation project infrastructure; and,
- Water Management During Construction (further detailed in Section 3.4.8)
  - Complexity of Site hydrostratigraphy presents multiple sources of water that will need to be managed during source area removal, i.e., a) water in the Overburden with variable flows, and b) pressurized Cape May Formation water which will cause

groundwater to up-well into any excavation that penetrates or significantly reduces the thickness of the MMC. Without groundwater management these conditions can destabilize White Material and arsenic-containing MMC excavations, especially where they breach the confining pressure of overlying material to a level below the Cape May Formation potentiometric surface (i.e., a certain thickness of material above the Cape May Formation is necessary to maintain confined hydraulic conditions);

3.3 Former Rhodes Drum and One-Story Ponte Equities Building Demolition

As part of the remedial action, the SOW requires the demolition and removal of the former Rhodes Drum Building on the Martin Aaron Property, and the one-story portion of the building on the Ponte Equities Property. Because of the dilapidated condition of these existing buildings, including a partial roof collapse, additional investigation within these structures would expose field personnel to unsafe working conditions. As a result, and as presented in the RDWP/PDI Work Plan, the above-grade portions of the former Rhodes Drum Building and one-story portion of the Ponte Equities Building (roofs and walls) were demolished and removed prior to performing pre-design investigation activities at the Site. The building substructures (floor slabs and foundations) were left in-place, leaving the material below them unexposed. The former location of each structure is depicted on Drawing 1.

A pre-demolition baseline condition survey (Appendix A) of the three-story building was completed by a structural engineer in 2009 prior to initiation of demolition of the former Rhodes Drum Building and one-story Ponte Equities Building to document its existing physical condition. In general, the three-story building was found to be in a state of disrepair, with existing damage, and pre-design investigation demolition could possibly loosen mortar, loosen concrete, and cause portions of the parapet to collapse.

Reasonable care and precautions were taken during demolition of the former Rhodes Drum Building and one-story Ponte Equities Building to maintain the existing condition of the immediately adjacent three-story Ponte Equities Building and the neighboring Comarco Building. To reduce transmission of vibrations from demolition to the three-story Ponte Equities Building, the roof structure of the partially collapsed one-story building spanning from the wall of the three-story building to the first intermediate support was freed from the rest of the structure prior to demolishing the rest of the structure. A combination of hand work and small demolition equipment was then used to complete the work against the three-story building to remain.

Upon completion of the pre-design demolition, the three-story building was re-surveyed by the structural engineer to assess if damage had occurred as a result of demolition that further compromised the structural condition of the building (Appendix A). Only minor cosmetic damage to some brick surrounding beam pockets was noted after demolition. The condition survey reports have been included in Appendix A because they are relevant to remedial excavation considerations discussed in this 35% Design.

Complete documentation and final reporting of the demolition of the former Rhodes Drum Building and one-story Ponte Equities Building was included in the PDI Report (Golder, 2013). Therefore, the building demolition component of the Phase 1 RA is considered complete.

3.4 Preliminary Remedial Design

3.4.1 Design Criteria and Objectives

The Selected Remedy for contaminated soil at the Site consists of the excavation and off-site transportation, treatment (as necessary), and land disposal of materials containing concentrations of constituents exceeding the Source Area Cleanup Goals in the ROD Appendix II, Table 6. It also includes capping Overburden containing residual concentrations of constituents exceeding the direct contact soil cleanup goals in the ROD Appendix II, Table 6.

The objectives of the Phase 1 RA Remedial Design are to achieve compliance with the Performance Standards within the Limits of Soil Remediation as defined in Section IV of the Consent Decree, where remedial excavations can be performed without affecting the structural integrity of nearby structures. Implementation of the Remedial Design also achieves compliance with all ARARs identified in the ROD and listed above in Section 2.6.

Specific criteria used to develop the Remedial Design and meet the ROD and Consent Decree requirements include:

- Maintaining the level of service of South 6th Street;
- Maintaining functionality of the utilities surrounding the Site;
- Containing the remediation work within the spatial limits of the relatively small Site; and,
- Protecting the immediately surrounding neighborhood from fugitive dust, traffic impacts, and noise.

Specific criteria in accordance with Section IV of the Consent Decree SOW also includes measures to assure that excavation will not adversely affect the structural integrity of the three-story building on the Ponte Equities Property and the building on the Comarco Property.

3.4.2 Design Overview

The 35% Design presents the practical limits of excavation to allow removal of source and impacted materials. These limits have been developed based on further delineation of the Source Materials during the PDI and limitations imposed by geotechnical and structural engineering constraints as described in Section 3.4.5.3.

The area of the Site where excavation of material must occur has been segregated into four quadrants based on existing Site conditions, each containing varying combinations of excavation depth, buried structures, source constituents/depths, and groundwater control requirements. Each quadrant involves different excavation approaches developed to address their respective subsurface conditions and effectively accomplish the RAOs. The locations and approximate limits of the quadrants are shown on Drawing 3. The details regarding excavation, excavation support, and excavation dewatering methods to be used in each quadrant are discussed in subsequent sections of this 35% Design.

Multiple hydrostratigraphic units exist at the Site as described in Section 3.2.2 and detailed in the PDI Report (Golder, 2013). As further detailed in Section 3.4.5, internal excavation cells, bounded by temporary sheet pile walls, may be used within each of the quadrants for the purpose of controlling shallow groundwater flow into the excavations, with the exception of Quadrant I, where the confirmed depth of the VOC Source Material remains predominantly above the shallow groundwater.

The general vertical excavation and backfilling sequence within each excavation cell will be as follows:

- Remove the surficial layer of Overburden to expose buried structures. Segregate VOC Source Material from material that can remain on-site under the cap provided for in the ROD;
- As necessary, demolish, remove and process the buried concrete/masonry structures for reuse as excavation backfill, and remove for off-site disposal steel reinforcement and other large non-concrete, non-masonry structure or buried utility components;
- Install sheet pile walls where appropriate to form the excavation cell and control groundwater inflow;
- Lower the shallow groundwater table within the excavation cell, and depressurize the underlying Cape May Formation, where needed, to maintain excavation stability and prevent ponding within the excavation to allow excavation of materials “in the dry”;
- Verify that the VOC Source Material and arsenic-containing MMC have been removed to the cleanup goals using post-excavation samples, and using visual confirmation in the case of White Material;
- Backfill with Overburden and/or imported clean fill to approximately 1-foot above the static water level prior to discontinuing dewatering operations in a cell. After ceasing dewatering operations in a cell, continuing backfilling with Overburden and/or imported clean fill; and,
- Place backfill materials to subgrade level.

For those areas outside the limits of Source Material that require a direct contract barrier, the following procedures will be implemented (see Section 3.4.12.1):

- Remove Overburden to a thickness of up to 24 inches. Reuse Overburden as backfill within Limits of Practical Excavation. The actual removal thickness will be determined when redevelopment grades are known;
- Place 2 feet of imported clean capping material or other surface capping materials as a direct contact barrier (Drawing 6); and,
- Existing concrete and asphalt (e.g., sidewalks and driveways) will be protected to the extent practicable and will be part of the direct contact barrier. Any existing concrete or asphalt within the Limits of Soil Remediation that is damaged during implementation of the remedy will be removed and replaced by a suitable direct contact barrier.

3.4.3 Site Layout

The approximately 6.5-acre Site provides relatively little space within which to manage the work. That is, the management of a considerable volume of Overburden, treatment and management of large volumes of groundwater, and removal of an extensive array of buried historic structures as discussed hereinafter. Separate areas will be required for: stockpiling of materials (both excavated and imported); facilities for treatment of groundwater extracted during excavation dewatering as well as rainwater that may contact Source Materials or that may run onto a work area; an infiltration pit for groundwater management; materials processing (i.e., crushing concrete and masonry from buried structures); and areas for general contractor laydown, offices, and storage. Because of these demands on available Site area and other reasons discussed herein, the preliminary design includes provisions for dividing the Site into smaller subareas for sequential remediation.

By dividing the Site into work areas, locations of stockpiles, materials processing, and construction entrances can be sequenced and relocated as construction progresses. A conceptual Site layout during Phase 1 RA construction for one subarea is depicted on Drawing 3 to illustrate the concepts described. The remedial action contractor will be responsible for final determination of the appropriate relocation of the work areas during the Phase 1 RA construction so as to not disrupt completed remediation areas and to optimize the contractor's operations.

3.4.4 Site Security

The Site is located along a primary transportation corridor (South Broadway) in the City of Camden with regular pedestrian traffic. Crime is frequent to the area, and over the years the Site has been subject to trespass, vandalism, unlawful salvage, dumping, arson, and squatting. Thus, securing the Site from unauthorized access is a priority. The remedial action contractor will be required to implement procedures to maintain the security of the Site in order to protect personnel, equipment, materials and completed work.

3.4.5 Removal of Source Materials Within Limits of Soil Remediation

3.4.5.1 Excavation Areas

Source Material areas will be segregated into manageable excavation areas based upon considerations such as: depth of material to be excavated; depth of required excavation below groundwater; thickness of non-arsenic-containing MMC to remain; and, the presence and extent of buried structures. Currently, it is anticipated that the Site will be divided into four primary excavation areas or quadrants, but further consideration and refinement to the quadrant boundaries is likely as concepts are advanced to the 95% Design. The tentative boundaries for each of these quadrants are shown on Drawing 3, and the important aspects of each quadrant are described below with regard to excavation approach, including dewatering considerations.

- Quadrant I: This quadrant borders the Comarco Building and South Broadway. The VOC Source Material is generally located above the elevation of the shallow groundwater within the Overburden. Therefore, the excavation and removal of VOC Source Material can be accomplished with localized sumping, or similar techniques, to control groundwater. Open cut excavation will be performed with the possible exception of any VOC Source Material immediately adjacent to the Comarco Building (refer to Section 3.4.5.3.3).

- Quadrant II: This quadrant borders South Broadway, the excluded area corresponding to the former building on the Scrapyard Property (Bakery Building), and Everett Street. As such, this quadrant contains VOC Source Material, White Material and arsenic-containing MMC. The White Material is generally below the elevation of the shallow groundwater within the Overburden. Therefore, excavation and removal of White Material will be performed in a series of sequential, localized excavations probably utilizing closed, four-sided sheet pile cells to reduce groundwater inflow such that sumps within the cells can be used to control groundwater. Groundwater within the cell will be maintained at a level below the final bottom of excavation elevation until post-excavation samples can be collected and the cell is backfilled above the static water level observed at the start of construction.

- Quadrant III: This quadrant borders Everett Street and South 6th Street. The quadrant contains White Material and arsenic-containing MMC, but it does not contain VOC Source Material. The White Material and arsenic-containing MMC are generally below the elevation of the shallow groundwater within the fill. However, these materials are not anticipated to extend to depths where groundwater from the Cape May Formation will cause instability of the remedial excavation bottom based upon the findings of the PDI. Therefore, excavation and removal of White Material and arsenic-containing MMC will be performed with sequential, localized excavations probably utilizing closed, four-sided sheet pile cells to reduce groundwater inflow such that sumps within the cells can be used to control groundwater. Groundwater within the cell will be maintained at a level below the final bottom of excavation elevation until post-excavation samples can be collected and the cell is backfilled above the static water level observed at the start of construction.

- Quadrant IV: This quadrant borders South 6th Street and the three-story Ponte Equities Building. The quadrant contains VOC Source Material, White Material and arsenic-containing MMC. Within this quadrant, the MMC is relatively thin to absent. Excavation to access and remove White Material and arsenic-containing MMC will therefore result in unloading overburden confinement above the Cape May Formation. This will jeopardize excavation bottom stability unless groundwater extraction is performed from the Cape May Formation. Therefore, excavation and removal of impacted-materials will be performed in a sequential, localized manner utilizing closed, four-sided sheet pile cells. Additionally, well points, or other effective groundwater extraction methods, as determined by the remedial action contractor and agreed by the Group, will likely be utilized to drawdown and maintain groundwater potentiometric levels within the Cape May Formation. Drawdown will be maintained at least 1-foot below the potentiometric elevation needed to maintain excavation bottom stability during removal of White Material and arsenic-containing MMC and until the excavation is backfilled to a level where pumping is no longer needed for excavation stability. The drawdown that will be required to control groundwater potentiometric levels in the Cape May Formation and excavation stability will be developed during the 95% Design. Refer to Section 3.4.8 for additional discussion of dewatering.

Preliminary excavation dewatering flow rates for conceptual, 50-foot by 50-foot excavation cells within these quadrants have been included in Appendix B. The final configuration of internal cells will be determined by the remedial action contractor.

3.4.5.2 Sequence of Construction

The general sequence of construction will be to remediate Quadrant I, a small area of Quadrant IV, Quadrant II, the remainder of Quadrant IV, then Quadrant III, in succession. This sequence is designed to allow previously remediated areas to be used as staging and stockpiling areas for the quadrants requiring the largest staging and stockpiling space. The water pre-treatment system (described in Section 3.4.8) and office facilities will be placed in areas of the Site that do not need to be excavated (Drawing 3).

Quadrant I will be excavated and backfilled first because the VOC Source Material: is limited to the Overburden: is relatively shallow compared to the White Material to be excavated from other quadrants: and generally is located above the shallow groundwater level. Upon remediation of Quadrant I, this area will be used as a storage and staging area. The first area to be remediated to address White Material will be the location for the infiltration pit within Quadrant IV in order to establish the pit in advance of Cape May Formation dewatering requirements for future excavation dewatering in the remainder of Quadrant IV. With the exception of Quadrant I and the infiltration pit, the remedial action contractor may be allowed to modify the sequence of construction based upon its construction approach.

Additionally, the remedial action contractor will need to address the large diameter pipe described in the PDI Report (Golder, 2013; Drawing 1) prior to remediation of Quadrants III and IV. At this 35% Design stage, it is envisioned that the large diameter pipe will be bulkheaded, pumped out (extracted liquid subject to pre-treatment and management of effluent based on contamination levels, if any), and removed. This will allow for installation of sheet piling for quadrant boundaries and internal cells, and will prevent the uncontrolled flow of liquid currently in the pipe into the remedial excavation. Further details related to decommisioning and removal of the the pipe, and handling of the liquid contained within it, will be developed as part of the 95% Design.

As discussed above, the locations of stockpiles, stabilized construction entrances, and, possibly, the material processing equipment will need to be relocated as construction progresses. However, the remedial action contractor will be required to store all excavated material and perform all materials processing within the limits of the Site during the Phase 1 RA construction. In general, excavated Overburden will be stockpiled in locations on the Site which have not yet been remediated for use as backfill. During later stages of excavation it will be necessary to temporarily stockpile excavated materials on portions of the Site which have been previously backfilled with Overburden and/or clean fill. To the extent possible, the duration of this particular stockpiling situation will be minimized. In any case, stockpile areas of excavated Source Materials will be underlined with geomembrane and contained within berms to avoid runoff and run-on of surface water in the stockpile areas. As part of the 95% Design, details and specifications for isolating the excavated material from previously placed fill will be developed.

3.4.5.3 Excavation Boundaries

3.4.5.3.1 South 6th Street

In addition to automobile traffic, South 6th Street is heavily trafficked by light- and heavy-duty commercial trucks, including tractor-trailers, as it provides sole access to the Camden Iron & Metal, Inc. scrap yard facility located at 1500 South 6th Street, immediately east of the Site. Based upon observations made during Site visits and PDI activities, heavily loaded trucks and tractor-trailers awaiting entry into the scrap yard, regularly park along the west curb of South 6th Street (adjacent to the Site) and often encroach upon the west sidewalk.

Adjacent to the Site, South 6th Street exhibits poor drainage and severely deteriorated bituminous pavement underlain by Belgium block paving used to construct the road in the 1890s. Remnants of a railroad spur are also evident in the street. This pavement section cannot tolerate settlement without compromising the current performance and level-of-service of the roadway. Since settlement can occur as a result of dewatering draw-down, or lateral movement of a shored excavation, additional precautions will be taken along this boundary.

Also, and as detailed in Section 3.2 the PDI Report (Golder, 2013), a number of public utilities are located under the right-of-way and sidewalk area of South 6th Street (Drawings 1 and 2). A potable water main and a brick combined sanitary/storm sewer system main underlie the roadway. Poorly maintained (partially or fully blocked) storm water inlets are located along the curbs along with buried Verizon telecommunications duct banks. In addition, another potable water main underlies the west sidewalk.

Overhead utilities are strung from timber utility poles located along the west sidewalk of South 6th Street within the Limits of Soil Remediation and less than 15 feet from the Site fenceline. The overhead utilities consist of electric and telecommunications, and the telecommunications include a fiber optic trunkline.

The overhead and underground utilities along South 6th Street provide major services to the surrounding area. Drawing 1 depicts the many utilities located adjacent to the Site fenceline. Without engineering controls to protect these utilities, adjacent excavation and dewatering activities could cause significant damage, potentially resulting in a disruption of service to the area due to ground vibrations and movement of soil. Similarly, work performed in proximity of the overhead electric power lines presents safety concerns and will require engineering controls to be implemented.

Because of the above-described conditions, excavation to the ROD-defined Limits of Soil Remediation would require relocation of both underground and overhead utilities that currently run along South 6th

Street. While not currently known if relocation of utilities is even feasible, this process would result in lengthy delays in order to allow time to complete feasibility studies and designs, to obtain the necessary permits, approvals and legal and indemnification agreements, and to implement the work.

Therefore, in order to maintain the existing performance and level-of-service of South 6th Street and to protect the existing overhead and underground utilities, the remedial design relies on two primary protective measures: 1) establishing the practical limit of excavation at the Site fenceline, which is offset approximately 12 feet from the Limits of Soil Remediation, providing for a 6- to 12-foot offset from the public utilities, and 2) a robustly designed excavation support system which will resist lateral deformations and protect against associated utility disturbance. A small volume of White Material and arsenic-containing MMC remaining below the west sidewalk of South 6th Street will be addressed by the remedy cap and institutional controls, as discussed in Section 3.4.5.4.

The preliminary design of the excavation support system along South 6th Street is based on stability and deflection criteria that are protective of the adjacent utilities and roadway. In consideration of the anticipated soil, groundwater, and traffic loading, as well as the depth of remedial excavation, a cantilever sheet piling design with acceptable top deflection (less than about 2 inches) cannot be achieved even with heavy steel sheet pile sections. A conventional tie-back sheet piling design using anchors extending behind the excavation face (i.e., below South 6th Street) to limit deflection is not feasible due to potential interference with the underground utilities. A sheet piling design utilizing a waler and internal rakers anchored in front of the excavation face on the Site property was also considered. However, accommodation of the raker anchorage would negatively impact excavation productivity because the anchorage would be underlain by materials requiring excavation and off-site disposal. Therefore, the preliminary design for a support system allowing excavation to the practical limit of excavation (Drawing 7) utilizes heavy steel sheet piling stiffened and braced with a heavy waler and king piles. Calculations supporting this preliminary excavation support system are provided in Appendix C-1.

Further considerations and refinements of the design of the excavation support system along South 6th Street will be provided in the 95% Design. Design details to be refined include establishing acceptable vibration and deflection criteria for the excavation support system and development of monitoring procedures to be implemented during construction that will provide action levels that are protective of the roadway and utilities.

3.4.5.3.2 Ponte Equities Building

The three-story Ponte Equities Building primarily consists of a cast-in-place, reinforced concrete column and beam structure with integral floor and roof slabs with masonry infill. The building support is believed to be founded in the competent sand of Cape May Formation based upon findings from a test pit excavation (PDI Report: Golder, 2013). The three-story building also includes a one-story, masonry boiler house appendage and electrical room building. The building is estimated to have been constructed in the late-1910s or early-1920s, and no construction plans are available for the building.

As discussed in Section 3.3., building condition assessments were conducted by Popoli Engineering, Inc. (Popoli) of Blue Bell, Pennsylvania, in 2009 prior to and following the demolition of the one-story Rhodes Drum Building and the one-story Ponte Equities Building. At that time, the building was found to be in a state of disrepair with existing damage, including cracked and spalled concrete, cracked and missing mortar, and loose masonry infill. Also, a portion of the building's parapet had previously collapsed onto the neighboring Comarco Building. In accordance with the Section IV of the SOW, the remedial excavation must not adversely affect the structural integrity of the three-story Ponte Equities Building. In support of this requirement, an additional assessment of the building's current condition was performed by Popoli on August 19, 2013 to assess the current condition of the building. In general, the three-story Ponte Equities Building remains in a state of disrepair and has further deteriorated since the post-demolition condition assessment performed in April 2009.

Externally, the condition of the mortar joints in the masonry infill and parapet have worsened due to natural conditions such as freeze-thaw cycles and continued rainwater infiltration, and also the growth of vegetation, including saplings, within the exterior wall joints. Fallen bricks observed on the sidewalk along the east façade during the inspection provide further evidence of continued and recent deterioration. Progressive deterioration has increased damage to some concrete frame elements, evident by observed increase of spalling concrete and a crack at the northwest corner. Also, the boiler stack has lost positive anchorage to one of the roof-mounted guy wires and the masonry of its supporting base has new/larger cracks than observed in 2009. Interior damage remains approximately the same with the most notable change being increased efflorescence due to continued, and possibly worsening, water infiltration from the leaking roof and roof drains that empty into the building (i.e., pipes have been removed). Appendix A contains copies of Popoli's reports documenting its findings and professional opinions with regard to the three-story building's condition.

Popoli cautions in its reports that construction-induced vibrations may dislodge already loosened and/or weakened concrete and masonry in the exterior wall of the three-story Ponte Equities Building. Additionally, dewatering adjacent to the building, i.e., without the offset and sheet piling to prevent drawdown outside of the excavation, may cause MMC materials below the floor slab to consolidate, thereby increasing the potential for settlement of the floor slab. As such, the remedial design relies on two primary protective measures: 1) establishing the practical limit of excavation at an offset distance that will limit the vibration amplitude at the three-story Ponte Equities Building caused by sheet pile driving to limit the influence of dewatering activities, and also excavation and backfill equipment and 2) vibration and settlement monitoring and protective criteria controlling excavation and cap construction methods in proximity to the three-story building. Also, the collapse of portions of the north wall could pose a hazard to Phase 1 RA construction workers and excavation equipment operating in proximity of the building; a hazard to the adjacent Comarco Building and its personnel; and a hazard to pedestrians and vehicles on South 6th Street.

Project-specific threshold vibration limits and settlement monitoring criteria will be finalized during the 95% Design; however, for historic structures and structures in poor condition steady state vibrations are typically limited to a peak particle velocity of 0.3-inch per second or less (Appendix C-2). Because the amplitude of the vibration decreases with the square of the distance from it source, maintaining an offset from the building is also protective. Further, the remedial action contractor will be required to test removal activities with planned construction equipment prior to the start of full-scale remediation.

As detailed in the PDI Report (Golder, 2013), a buried subsurface structure was encountered during boring explorations within the footprint of the demolished one-story Ponte Equities Building. Subsequently, a test pit was advanced through the floor slab of the former one-story building, where the floor slab exhibited a bowled depression. The excavation revealed a below-grade basement-like structure that had been filled with construction and demolition debris and loose fill, apparently placed prior to construction of the one-story Ponte Equities Building floor slab and the three-story Ponte Equities Building boiler house. The approximate location and extent of the buried basement are depicted on Drawing 1. More precise measurements of the dimensions of this underground structure connected to the three-story building will be made by a surveyor during 95% Design.

In order to not adversely affect the existing structural condition of the three-story Ponte Equities Building, which includes the one-story boiler house, the preliminary design of the practical limit of excavation is at an offset from the north façade of the three-story structure. This practical excavation boundary is coincident with the north wall of the buried basement and existing longitudinal joint of the former one-story building floor slab. This offset will avoid removing the existing support of the boiler house, which partially straddles the buried basement. The offset provides separation which allows for attenuation of construction-induced vibrations between the remedial excavation face and the three-story building façade and also allows the installation of sheeting to decrease the influence of dewatering activities on the building.

The excavation at the offset limit can be conducted using shoring, excavation and dewatering methods controlled by vibration and settlement monitoring. A representation of the excavation approach along the three-story Ponte Equities Building is depicted on Drawing 7. Further analysis during the 95% Design will examine whether short sheet piling can be utilized at the offset limit within prescribed vibration and settlement limits for water control purposes.

A small volume of White Material and arsenic-containing MMC will remain beneath the offset area, i.e., between the practical limit of excavation and the three-story Ponte Equities Building (Appendix D).

However, this area will be under the cap and further addressed by institutional controls, as discussed in Section 3.4.5.4.

3.4.5.3.3 Comarco Building

The Comarco Building, which houses a prepared foods factory, is located on the southeast corner of the Site. Although impacted material beneath the Comarco Building is exempted from the Limits of Soil Remediation, VOC Source Material has been delineated to the boundary of the Martin Aaron Property immediately adjacent to the Comarco Building. Therefore, remedial excavation for VOC Source Material removal is expected to extend to the north façade of the building. The depth of this excavation is expected to be relatively shallow, and to terminate above the shallow groundwater level.

Building design plans for the current configuration of the Comarco factory were provided by the Owner. The plans, prepared by Tesco, Inc. of Voorhees, New Jersey, and dated July 1998, indicate that the portion of the factory building immediately adjacent to the Martin Aaron and Ponte Equities Properties is founded on shallow, continuous spread footing foundations. The foundations are constructed of steel reinforced, cast-in-place concrete and designed based upon a building code presumptive allowable bearing capacity of 1,500 pounds per square foot. It is suspected that the foundations are supported on un-engineered Overburden extending beneath and outside of the footing limits. The building is constructed of mortared concrete block, with the first course constructed as a bond beam. Where structural steel for the upper floor or roof is supported by the masonry, the cores of the concrete block have been in-filled and reinforced over the height of the wall. The building appears to be well-maintained, and the north façade exhibits no visible defects that would indicate structural impairment requiring special consideration during remedial excavation.

While the Comarco Building is expected to be more resistant to excavation-induced vibrations than the three-story Ponte Equities Building, its masonry construction is still susceptible to cracking due to vibrations. Surface cracks in exterior masonry joints or concrete blocks would require repair/sealing to avoid more significant deterioration over time due to water infiltration and freeze-thaw cycles. In addition, the factory houses food processing and refrigeration equipment, which may be susceptible to vibrations. Therefore, vibration and movement criteria and monitoring during remediation controlling the means and methods of remedial excavation will be required to protect this structure. These criteria and the monitoring program used to control remedial excavation work will be developed during the 95% Design.

The 35% Design includes an excavation approach which may allow the excavation to proceed without adversely affecting the structural integrity of the Comarco Building and minimizing (but potentially not avoiding) localized cracking. VOC Source Material will be removed by open-cut excavation in a series of sequential smaller excavations (slot trenches) to the outer edge of the building foundation (Drawing 7). This series of sequential slot trenches will be used to control reduced foundation support during remedial excavation since only short segments of the foundation will be exposed at any given time. Because the Comarco Building is supported by reinforced concrete continuous spread footing foundations, and the masonry includes a first course bond beam, a short span of temporarily unsupported or reduced support foundation may not adversely affect the building. The 35% Design approach for remedial excavation of VOC Source Material and backfilling along the Comarco Building is described by the following steps:

- Step 1: Excavate vertically to the bottom of the footing along the entire north side of the building;
- Step 2: Excavate a series of slot trenches 4-foot wide by 12-foot long by required depth for VOC Source Material removal perpendicular to the face of the building and separated by at least 8 feet. Where not obstructed by debris, the vertical depth required to remove VOC Source Material will be pre-delineated using a sampling program performed during remediation and prior to excavation;
- Step 3: Backfill the trenches immediately upon completion of VOC Source Material removal to the pre-delineated depth (i.e., same day) with flowable fill to a level at least 1-foot above the bottom of foundation and allow the flowable fill to cure;
- Step 4: Repeat Steps 2 and 3 adjacent to completed and cured trenches until all VOC Source Material is removed; and,
- Step 5: Place and compact clean backfill above the flowable fill to cap design grade.

Slot trench excavations will be terminated and immediately backfilled or set back from the footing if debris in the Overburden begins to slough into the excavation before reaching the foundation. The preliminary design of the excavation approach along the Comarco Building is shown on Drawing 7. This approach involves removal of VOC Source Material along the building, except where setbacks determined by monitoring during remediation are required to avoid excessive vibration or building settlement. Alternate excavation methods may be evaluated during development of the 95% Design including grouting of the Overburden immediately adjacent to the Comarco Building to address the potential of material sloughing from below the foundation into a slot trench.

3.4.5.3.4 South Broadway

South Broadway is a main thoroughfare for both public traffic and public utilities. A buried PSE&G high-voltage electric duct bank, storm water inlets, and overhead utilities that include multiple levels of electrical feeds and a telecommunication trunkline strung from timber utility poles are located adjacent to the Site near the curb (Drawings 1 and 7).

During the PDI, and as presented in the PDI Report (Golder, 2013), White Material and VOC Source Material were found adjacent to South Broadway and within the Martin Aaron Property (i.e., about 30 feet inside the property line). These materials were encountered in thin layers at relatively shallow depths (about 5 feet below existing grade) and above the shallow groundwater level. Furthermore, Sanborn Maps indicate that the historic tannery structures were constructed up to the approximate east edge of the present day sidewalk. Therefore, White Material, arsenic-containing MMC and VOC Source Material are not anticipated to extend significantly, if at all, below the east sidewalk of South Broadway. Due to the expected shallow excavation depth (i.e., terminating above groundwater), the preliminary design for excavation along this boundary utilizes open-cut methods. It is anticipated that no White Material, arsenic-containing MMC or VOC Source Material will be left in-place along the South Broadway Limits of Soil Remediation.

3.4.5.3.5 Everett Street

Everett Street comprises the northern-most boundary of the Site. The delineated limit of impacted material does not encroach upon the right-of-way for Everett Street, and terminates within the Scrapyard Property. As discussed in the PDI Report (Golder, 2013), an apparent engineered fill was encountered within the Scrapyard Property. Also, varying shallow groundwater conditions were encountered including a local, highly transmissive area attributed to the filled relic Line Ditch. Therefore, for purposes of groundwater control during remedial excavation, cantilever sheet piling will be installed, and material will be excavated from within the sheet piled area. Because the sheet piling will be used only for groundwater control, and its limits will be sufficiently offset from the roadway right-of-way and utilities or structures, robust sheeting will not be needed to protect against lateral deflection and reduce ground settlement outside of the sheeting. The design of the sheet piling along the northern boundary of remedial excavation will be developed by the remedial action contractor's licensed professional engineer. However, the design, materials, and installation method will be a required construction submittal, subject to the Group's review and approval.

3.4.5.4 Arsenic-impacted Volume and Arsenic Mass Outside of Practical Limit of Excavation

As described above, practical excavation boundaries have been developed which leave minimal amounts of White Material and arsenic-containing MMC in place in two areas. These areas include: 1) an area below the sidewalk along South 6th Street, and 2) an area below the excavation offset from the three-story Ponte Equities Building. The results of the PDI indicate that no VOC Source Material will be left in-place in these two areas.

Subsurface data from over 180 borehole locations (PDI Report, Golder 2013) were input into a 3-dimensional visualization program to aid in the interpretation of the Site stratigraphy. At each borehole location a stratigraphic column (borehole log) is geo-referenced and surfaces are created by interpolating stratigraphic contacts across borehole locations. The key Site contacts are the following: Overburden, White Material, arsenic-containing MMC, and Cape May Formation. Stratigraphic surface contour maps, derived from elevation data at each borehole where a stratigraphic unit boundary was observed, were also created to aid in the overall interpretation of the Site stratigraphy and to corroborate the 3-dimensional surfaces. Using both methodologies, a fully 3-dimensional solid model (i.e., closed volumes) of the Site geology was generated so that unit volumes could be calculated based on areal extent of interest and unit thickness. Overburden and White Material unit volumes were calculated. The MMC unit was subdivided using arsenic analytical chemistry data to isolate the thickness of arsenic-containing MMC that would require removal. Arsenic-containing MMC exists in the uppermost horizon of the unit. The concentration of arsenic decreases rapidly with depth into the MMC unit. The thickness of arsenic-containing MMC was determined by evaluating the bottom of impacts as defined by the first analytical sample at depth with an arsenic concentration below 300 mg/kg. Using the Limits of Soil Remediation as the areal extent and the target unit thickness, a total volume of each Site stratigraphic unit was calculated.

- South 6th Street – Subsurface data was not collected below the sidewalk along South 6th Street due to the presence of underground and overhead utilities. Therefore, data collected from boreholes completed along the fenceline parallel to South 6th Street were extrapolated to the east under the sidewalk to provide a conservative volume estimate of arsenic-impacted materials left in-place (Drawings 3 and 7). The thickness of White Material was estimated to be 2 feet and was extrapolated to the extent of the curb line on South 6th Street (approximately 12 feet). The thickness of arsenic-containing MMC was estimated to be 1-foot and was also extrapolated to the extent of the curb line on South 6th Street. This extrapolation is believed to be conservative based upon historical evidence that South 6th Street, including the embankment upon which the street was built, was present prior to historic tannery operations. As such, the layer of White Material, which has been assumed to extend below the sidewalk at the same thickness as found at the fenceline, more likely pinches out as it extends eastward under the sidewalk. Based upon this conservative extrapolation, it is estimated that approximately 175 cubic yards of White Material and 120 cubic yards of arsenic-containing MMC will be left in-place below the west sidewalk of South 6th Street; and,
- Ponte Equities Building Area – Subsurface data was collected in the area where source material will be left in-place adjacent to the three-story Ponte Equities Building (Drawings 3 and 7). Therefore, the volume of materials in this area was calculated based upon the extent and thickness observed in boreholes (not extrapolated) in this area. The areal extent of material that will be left in-place (approximately 4,560 square feet) along with the unit thicknesses determined from the 3-dimensional geologic model were used to calculate the volume of White Material and arsenic-containing MMC. Approximately 300 cubic yards of White Material and 130 cubic yards of arsenic-containing MMC will be left in-place in this area.

The total volume of White Material and arsenic-containing MMC within the Limits of Soil Remediation is approximately 13,380 cubic yards. Approximately 5% of these arsenic-impacted materials will be left in-place because of the need to protect South 6th Street, utilities, and the Ponte Equities Building (Appendix D).

3.4.6 Materials Management

Management of excavated materials will require segregation and off-site disposal of VOC Source Material, White Material and arsenic-containing MMC. VOC Source Material is almost exclusively in Overburden at varying depths. Material containing arsenic concentrations that require off-site disposal (i.e., White Material and arsenic-containing MMC) are only encountered at depth below Overburden. In some areas (Drawing 2), the VOC Source Material excavation areas and the White Material/arsenic-containing MMC excavation areas overlap; in others they do not. These patterns, which are well understood as a result of PDI field efforts, will require excavation of Overburden that contains constituent concentrations above Direct Contact Cleanup Goals, but below VOC Source Area Cleanup Goals. Overburden which is removed to expose underlying material will be managed and stockpiled separately from material that requires off-site disposal. Rather than being disposed off-site, Overburden will be contained under a cap, as provided for in the ROD and the SOW.

After processing, concrete/masonry remnant structures removed to access deeper materials may be adequate for reuse as fill to support the final cap. Specifications for processing of concrete/masonry slabs will be developed during the 95% Design. Overburden containing interspersed debris fragments may be adequate for backfilling and supporting the cap without processing. Excavation and off-site disposal of large volumes of materials will require backfilling and grading to replace the lost volume and restore the Site to the grade required for the cap (Sections 3.4.11 and 3.4.12). This will be accomplished with a combination of both imported NJDEP Certified Clean Fill and excavated Overburden.

Because the proposed areas of excavation extend to nearly the entire horizontal limits of the Site, the 35% Design required consideration of spatial limitations relating to segregation, processing and stockpiling of excavated materials and imported backfill to protect against cross-contamination. The 35% Design has determined that materials management can be performed on-site as the excavation proceeds to other quadrants. Drawing 3 provides a conceptualized materials management layout when excavating in Quadrant IV. The 95% Design will provide further details to illustrate how materials management areas will be sequentially shifted as the Phase 1 RA advances across the Site. The logistics of managing load-out areas and locating and managing stockpiles will be the responsibility of the remedial action contractor. However, due to Site constraints, the remedial design will impose Phase 1 RA implementation performance standards and limitations within which the remedial action contractor will need to operate to implement the Phase 1 RA. The 35% Design of these performance standards and constraints to management of materials is described in the below subsections.

3.4.6.1 Excavated Overburden with Concentrations Below Off-Site Disposal Cleanup Goals

Appendix II, Table 6 of the ROD set forth the cleanup goals for soil requiring off-site disposal. These include a removal and off-site disposal concentration for arsenic (300 mg/kg), and also specific concentrations for VOC constituents including benzene (1 mg/kg), chloroform (1 mg/kg), tetrachloroethylene (1 mg/kg), trichloroethylene (1 mg/kg) and vinyl chloride (1 mg/kg). As further identified in the SOW, VOC Source Material is defined as containing total VOCs exceeding 1 mg/kg. The RDWP (Golder, 2008) further determined that the calculation of TVOCs and the subsequent delineation of the VOC Source Areas will be based on the sum of the concentrations of VOCs listed in ROD Table 6 (i.e., the same VOCs that have groundwater cleanup goals).

In developing the cleanup goals for the VOC Source Material, USEPA considered the NJDEP Impact to Groundwater Soil Cleanup Criteria (see statutory determination in the ROD addressing compliance of the Selected Remedy with ARARs). The VOC Source Area Cleanup Goal of 1 mg/kg TVOCs removes sources of groundwater contamination (i.e., reduces or eliminates the migration of Site contaminants from soil to groundwater) in both shallow and deeper soil/fill. Pursuant to the ROD, remaining soils impacted with concentrations of COCs greater than the Direct Contact Cleanup Goals will be addressed by capping. As stated further in the ROD, periodic rounds of groundwater monitoring will be conducted to assess the effectiveness of the Source removal on improvement of groundwater conditions, and effectiveness of natural attenuation at the Site.

The PDI included additional sampling to further delineate the limits of Source Area material requiring removal according to the ROD. It was determined during the PDI that considerable areas of the Site include Source Area materials overlain by Overburden with COC concentrations below those requiring excavation and off-site disposal. Calculations based on the PDI delineation indicate as much as 30,000 cubic yards of Overburden will need to be excavated and temporarily stockpiled to access deeper materials requiring removal. Because of the limited available area for temporarily stockpiling excavated Overburden, special provisions will be required during material excavation. This will include excavating materials in a sequential manner. Each sequential excavation area will need to be sized so that temporary stockpile volumes do not exceed available temporary storage areas.

After removal of deeper materials requiring off-site disposal within a specific excavation area, the volume of disposed materials will be replaced with either imported NJDEP Certified Clean Fill, or stockpiled Overburden with residual concentrations of constituents below the removal-based Cleanup Goals, in some areas placed atop the NJDEP Certified Clean Fill (Section 3.4.11). These Overburden materials will be backfilled to the level necessary to allow construction of the final cap. Larger timbers, steel, pipes and other non-concrete/non-masonry debris material unsuitable for use as backfill will be removed by picking with an excavator and disposed at an approved off-site facility.

Because backfilled Overburden will include concentrations of constituents above the Direct Contact Cleanup Goals, it will be covered with engineered cap materials (Section 3.4.12). Backfilling of excavated Overburden containing concentrations in excess of the direct contact cleanup goals as described above is consistent with the provisions of N.J.A.C. 7:26E-5.29(c). This regulation allows use of alternative fill from an on-site source as part of a remedial action at an area of concern, provided that the contaminants present in the alternative fill are also present at the receiving area of concern. “Alternative fill” as defined in this regulation means material to be used in a remedial action that contains contaminants in excess of the most stringent soil remediation standards or site-specific alternative standards. Because the temporarily excavated Overburden will be returned to the same area from whence it was excavated, no sampling and testing will be required. Furthermore, this activity is consistent with Section 4.2 in NJDEP’s

"Alternative and Clean Fill Guidance for SRP Sites," updated December 29, 2011 (NJDEP, 2011), which imposes "like-on-like" requirements for use of alternative fill.

Appendix II, Table 6 in the ROD identifies direct-contact cleanup goals for soil for commercial/industrial Site uses. These include goals of 10 mg/kg for PCB Aroclor 1254 and for Aroclor 1260. During the development and review of the RDWP, it was noted that the NJDEP Non-Residential Direct Contact Soil Remediation Standard for PCBs had decreased by an order of magnitude (i.e., the NJDEP Soil Remediation Standard for PCBs had decreased to 1 mg/kg), from the 10 mg/kg value that existed at the time of the ROD. In the RDWP, the Group agreed to consider an order of magnitude evaluation of the NJDEP Direct Contact Soil Remediation Standards when determining the limits of capping.

Ten prior sample locations containing PCBs in fill greater than 1 mg/kg are shown in Figure 1. Figure 1 also shows the 44 other sample locations where PCBs were detected below 1 mg/kg, or were analyzed and not detected. As shown in Figure 1, three of the sample locations in fill containing PCBs greater than 1 mg/kg are within the limits of VOC Source Materials that will be excavated and removed for off-site disposal, while the remaining six locations with PCBs greater than 1 mg/kg in fill are in Overburden outside of VOC Source Areas, and above deeper materials requiring removal. Material at those six locations that will not be removed with VOC Source Material will be segregated for on-site consolidation. This will be accomplished by establishing a 5-foot by 5-foot initial excavation area centered at each prior Overburden sample location with PCBs greater than 1 mg/kg, with the initial excavation volume extending to the depth of the prior sample. These excavated Overburden materials with PCBs greater than 1 mg/kg will be segregated, ultimately emplaced on-site and protected with an appropriate cap type (Section 3.4.12.1 and Drawing 7). Post-excavation sampling, as described in Section 3.4.10.1, will be completed to verify the appropriate limits of excavation for these materials requiring segregation, capping and protection with specific institutional controls associated with future development plans known at the time of remediation.

The 95% Design will include further details addressing management and backfilling of excavated Overburden containing constituents in excess of the direct contact soil cleanup goals in the ROD, as determined by sampling performed during remedial investigations and the PDI.

3.4.6.2 Concrete and Masonry

Numerous structures have occupied the Site since the late-1800s. Remnant concrete and masonry foundations and concrete floor slabs beneath previously removed superstructures have been encountered across the Site. Buried concrete or masonry walls may require demolition/removal in order to access and remove deeper materials as required by the ROD. The buried concrete or masonry walls will be consolidated and processed with demolished concrete slabs. Concrete and masonry will be processed to remove reinforcing steel, and will be crushed to an allowable 6-inch maximum size for reuse as backfill on-site. Reinforcing steel removed from concrete during processing will be disposed off-site. Analytical sampling of crushed concrete/masonry stockpiles will be conducted for Source Material COCs listed in ROD Appendix II, Table 6. Crushed concrete/masonry containing concentrations below those requiring off-site disposal will be acceptable to remain on-site under the protection of the cap. Sampling and testing frequency and methods will be in accordance with the requirements of NJDEP Solid and Hazardous Waste Management Program's *"Guidance for Characterization of Concrete and Clean Material Certification for Recycling"* updated January 12, 2010 (NJDEP, 2010).

Two concrete chip samples were obtained during the Stage 2 PDI and analyzed for various constituents, including PCBs. The results exceeded the 1 mg/kg Direct Contact Cleanup Goal that the Group agreed to consider during remedial design (Figure 1). After removal and crushing, the slab(s) containing the two concrete chip samples will be sampled and tested for PCBs. The crushed concrete/masonry testing results from this slab/these slabs will be evaluated to determine if the crushed concrete/masonry will be consolidated with other backfilled fill with similar PCB concentrations under the protection of a cap as described in Section 3.4.6.1 and 3.4.12.1.

Detailed sampling plans and criteria for segregating and reusing crushed concrete/masonry, including specifications for processing and placement, will be developed during the 95% Design. These plans will be consistent with NJDEP Solid and Hazardous Waste Management Program's *"Guidance for the Sampling and Analysis of Concrete Designated for Recycling"* updated February 20, 2007 (NJDEP, 2007).

3.4.6.3 VOC Source Material

VOC Source Material, as delineated during the PDI, will be excavated and either temporarily stockpiled on-site (in a bermed and underlined area) or loaded directly into trucks for disposal at an approved off-site facility. For the purpose of design and based on sampling during prior investigations, VOC Source Material will be disposed at a Subtitle D landfill acceptable to the Group. Water accumulated within the VOC Source Material stockpile containment area will be collected for treatment and disposal as allowed by permit equivalencies.

3.4.6.4 White Material

Excavation of materials overlying White Material will be performed with material management described above, until the presence of White Material is visually identified. The excavation will proceed carefully as it approaches the top of the White Material as interpreted from the PDI delineation sampling. Nevertheless, some overlying fill is anticipated to be excavated along with the uppermost portion of the White Material, due to inherent difficulties associated with segregating the fill from White Material (e.g., use of heavy equipment in combination with an undulating surface of the White Material). Care will be taken to segregate VOC Source Material directly overlying the White Material, using visual and field screening methods. White Material will be stockpiled on-site in a separately bermed and underlined containment area, or will be directly loaded for transport to the approved off-site treatment and disposal facility. If the White Material does not pass the paint filter test, direct loading may not be possible and additional steps will be taken to precondition the material on-site so that it passes the paint filter test before transportation, such as air-drying or the use of additives. Free water contained in the White Material stockpile containment area will be collected and combined with excavation water for on-site treatment (Section 3.4.8.2) and off-site disposal.

The results of analytical testing completed on White Material samples during the Stage I and II Pre-Design Investigations indicated total arsenic concentrations ranging from 24.2 to 199,000 mg/kg with arsenic concentrations in the TCLP extract up to 116 milligrams per liter (mg/L). Of the 10 samples analyzed, arsenic concentrations above the TCLP regulatory limit of 5 mg/L were detected in four of the samples. A limited number of other constituents were also detected above the universal treatment standards (40 CFR Part 268.48) in samples that exceeded the arsenic TCLP limit (Golder, 2013).

Due to exceedances of the TCLP regulatory limit for arsenic, and a limited number of other constituents (i.e., SVOCs and pesticides), the White Material cannot be land disposed until compliance is obtained with the applicable treatment standards for arsenic and underlying hazardous constituents, as defined in 40 CFR Part 268.40.

A treatability study was completed subsequent to submittal of the PDI Report (Golder, 2013) . The study evaluated treatment of four samples of White Material collected from test pits. Due to the variability of arsenic concentration in the White Material observed during prior investigations, field x-ray fluorescence (XRF) measurements were collected to screen arsenic concentrations prior to selecting samples for treatability testing. Based on XRF measurements, the arsenic concentrations in the selected samples ranged from 2,792 to 11,328 mg/kg. These concentrations were generally lower than the range of arsenic concentrations of 5,030 to 22,500 mg/kg obtained from fixed lab analyses of splits of the same samples. A comparison of the XRF results to the fixed lab test results indicated an average variation of approximately 5,000 mg/kg.

Four samples were submitted to Clean Earth of North Jersey, Inc. (CENJ) and one sample was submitted to Environmental Waste Minimization Inc. (EWMI) for treatability testing. The results of treatability testing (Appendix E) indicate that the White Material can be effectively treated by mixing with cement kiln dust, cement and other agents. Treatability tests were completed by CENJ on samples with total arsenic concentrations ranging from 3,262 to 12,310 mg/kg, with pre-treatment arsenic concentrations in the TCLP extract ranging from 0.14 to 60 mg/L. After treatment the arsenic concentrations in the TCLP extract decreased to levels well below the TCLP regulatory limit of 5 mg/L. EWMI's treatability result for its sample also showed reduction to below the TCLP regulatory limit. These results indicate the White

Material can be effectively treated to below the 5 mg/L regulatory limit for arsenic. Although testing was not completed to evaluate other underlying constituent concentrations after treatment that may be present in the White Material, the firms indicated that they believed treatment of arsenic to allow land disposal would also address the underlying constituents to comply with land disposal requirements. Therefore, waste treatability testing indicates that the White Material can be treated at licensed off-site facilities with readily available materials to allow land disposal as contemplated in the ROD.

Specifications developed during the 95% Design will establish the performance standards which said treatment and disposal must meet. During implementation of the Phase 1 RA, testing will be completed as required by the off-site disposal facilities to verify compliance with applicable regulations prior to land-disposal in accordance with RCRA land-ban requirements. Further details on additives and treatment prior to disposal at facilities acceptable to the Group will be identified during execution of a remediation contract with the Group. Such details will be provided for USEPA information in connection with preconstruction contractor submittals before any materials are shipped off-site for treatment and disposal.

3.4.6.5 Arsenic-Containing MMC

Arsenic-containing MMC will be removed concurrently with excavation of White Material, but where it can be practically segregated using standard excavation methods, it will be staged separately. Excavation using heavy equipment in combination with an undulating excavation surface and soft soil conditions may not accommodate the complete segregation of all arsenic-containing MMC from White Material. When this is the case, some arsenic-containing MMC will be managed as White Material. Should the removal of additional arsenic-containing MMC be required after the initial excavation to achieve the cleanup goal for off-site disposal, a second excavation pass will be completed to remove the necessary thickness of additional arsenic-containing MMC based on confirmatory sampling. Arsenic-containing MMC removed during a second excavation pass may be stockpiled in a separate and underlined containment area, or direct loaded for off-site disposal if it will pass the paint filter test.

As needed to pass the paint filter test, arsenic-containing MMC will be allowed to dry in an on-site stockpile. Should the time required to air-dry the arsenic-containing MMC impede the construction schedule, amendments may be added to accelerate the process. Free water contained in the stockpile containment area will be collected and combined with excavation water for pre-treatment and off-site disposal where allowed by permit equivalencies.

Prior sampling of MMC has focused on determining total arsenic concentrations, as discussed in the PDI Report (Golder, 2013). To date, no TCLP analyses have been completed on arsenic-containing MMC, although results of the MMC sequestration study during the PDI suggest very low leachability. Nevertheless, TCLP sampling and analysis will be performed during remediation to characterize this waste stream for appropriate disposal. Arsenic-containing MMC will be handled as RCRA hazardous waste unless future testing indicates otherwise.

3.4.6.6 Imported Fill

Any fill imported from off-site sources for use in backfilling will be NJDEP Certified Clean Fill (N.J.A.C. 7:26E). These materials will be stockpiled separately as shown on Drawing 3, for selective use as backfill as described in Section 3.4.11. Gradation specifications for imported backfill will be prepared during the 95% Design. NJDEP Certified Clean Fill stockpiles will not require underlined containment.

3.4.7 Pre-Excavation Sampling

Where not obstructed by debris or structures, pre-excavation samples will be collected within the VOC Source Material identified along the Comarco Property line adjacent to the building. These samples will be collected during earlier stages of remedy implementation in Quadrant I. The goal of this sampling program will be to pre-delineate the vertical extent of VOC Source Material in the area where special measures will be employed to avoid impacting the building during VOC Source Material removal (Section 3.4.5.3.3 and Drawing 7). This will avoid the unnecessary removal of Overburden close to the building. This will also allow a reduced reliance on post-excavation sampling to verify VOC Source Material removal in areas where prompt backfilling with flowable fill is planned to restore ground support to the building foundation where removal of materials reduces that support.

The pre-excavation sampling program will be implemented along the approximate 50-foot length of the north building face. It will consist of up to ten borings, completed to a targeted depth of 10 feet below ground surface. Five initial borings will be offset 3 to 5 feet from the face of the building. If impacts are not detected in the initial borings, five secondary borings will be completed at an off-set distance of between 10 and 12 feet from the building face. Samples will be collected from 2-foot intervals within each test boring and analyzed in the field using a gas chromatograph. Sample results will be used to establish the vertical limit of excavation, as well as whether VOC Source Material extends to, and/or below, the building footing level. Gas chromatograph analyses indicating the vertical boundary of VOC Source Material and the vertical limits of excavation in the “slot trench” excavation area will also be submitted to a fixed laboratory for analysis. Three samples are expected to be submitted to a fixed laboratory, based on the approximately 90-foot length and 12-foot width of the slot trench area shown on Drawing 7.

If the pre-excavation delineation test results support the current conservative interpretation of VOC impacts, the sequential excavations and measures discussed in Section 3.4.5.3.3 above will be advanced as close to the building as possible while maintaining the stability of the building. If the additional results indicate the lateral limits of VOC Source Material are set back from the building, a sloped or benched excavation approach will be developed that encompasses the refined delineation and may not require use of flowable fill in “slot trenches.”

The Group may pursue implementing removal and off-site disposal of VOC Source Material adjacent to the Comarco Building on an accelerated schedule to make the area available for expansion of the Comarco Building by the current owner. Details of this approach will be developed as part of the 95% Design, if development plans are known at that time.

3.4.8 Excavation Dewatering

3.4.8.1 Groundwater Control Extraction Rates

In order to remove materials located below groundwater that require off-site disposal, groundwater from two different water bearing layers will have to be controlled to maintain excavation stability. The shallow groundwater lying above the MMC will be managed using steel sheet piling to restrict flow into the excavations through highly transmissive areas of Overburden. Shallow groundwater will be pumped from excavations using filtered sumps. Sheeting and/or sumping is expected to be needed in excavations within all four quadrants shown on Drawing 3, with the least amount of dewatering expected for excavations in Quadrant 1 (Section 3.4.5.1).

As described in Section 3.4.5.1, excavations to remove arsenic-containing MMC will require dewatering from the Cape May Formation aquifer beneath excavations to maintain the piezometric pressure at a level that will maintain excavation bottom stability. This will likely involve use of vacuum well points or other well extraction systems. Sheeting may be extended to semi-confining layers (where present) in the Cape May Formation (Drawings 4 and 5) to reduce the required extraction volume and avoid depressurizing the underlying Cape May Formation in undesired areas.

In order to determine potential shallow and Cape May groundwater dewatering rates, water management and treatment concepts, hydraulic conductivity data obtained from groundwater pumping tests performed during the PDI were used to calculate theoretical pumping quantities for excavation water control. Conceptual excavation cells with dimensions of 50-foot by 50-foot and contained by steel sheeting were analyzed, as this cell size represents the smallest excavation cell size that would likely be practical considering the size of the remediation area. Two scenarios were modeled, and the modeling performed to obtain preliminary estimates of excavation dewatering rates is described in Appendix B.

Dewatering Scenario 1 examined during the 35% Design included a calculation of pumping rates from the shallow groundwater in Overburden above the MMC. Although a hydraulic conductivity of 2.4 feet per day was used in the model based on PDI tests, test pit excavations performed during the PDI encountered variations in the Overburden with hydraulic conductivity one to two orders of magnitude higher than the typical value modeled. Therefore, temporary sheeting is expected to be needed not only to provide excavation support, but to also cut off inflow associated with large variations in Overburden hydraulic conductivity. It is Golder’s experience that the modeled hydraulic conductivity is representative of sheeting leakage through interlocks and inflow through the excavation bottom for sheeting not extending to an impermeable lower layer. Calculations indicate that approximately 2 to 5 gallons per minute (gpm) may be expected and require pumping and management to control shallow groundwater above the MMC flowing into a 50-foot by 50-foot excavation area.

Based on these calculations, consideration of likely ranges in excavation sizes that the remedial action contractor may desire for efficiency and material management, the 35% Design considers that shallow groundwater may be generated in the range of 10 to 20 gpm on a sustained basis to control and remove shallow groundwater during excavation. Other factors considered in determining system requirements for the 35% Design included:

- Allowance for system downtime during operation and maintenance requiring storage of continuing pumping, and the need to treat stored water upon system restart;
- Storm events adding to the excavation water;
- Heterogeneities associated with underground features such as the relic line ditch and the large diameter pipe discovered during the PDI;
- Treatment of water accumulated in lined stockpile areas; and
- Safety factors typically used in sizing pumps and treatment system components.

As a result of the above-referenced calculations and factors listed above, the 35% Design examined requirements for treating, managing and disposing of shallow groundwater with a system capacity in the range of 25 to 50 gpm.

Dewatering Scenario 2 examined during the 35% Design included calculating the potential pumping to maintain excavation bottom stability by lowering the piezometric pressure in the Cape May Formation by about 4 to 5 feet (see cross sections extending through Quadrant IV in Drawings 4 and 5). Conceptual 50-foot by 50-foot excavation cells with sheeting extended to an underlying semi-confining layer was modeled. As summarized in Appendix B, calculations indicate that the required dewatering rate will be approximately 20 gpm for stabilizing a 50-foot by 50-foot sheeted excavation, several times higher than that required for controlling groundwater in the shallow unconfined groundwater zone. This higher rate of pumping is associated with the significantly higher average hydraulic conductivity of the Cape May Formation determined during the PDI pumping tests.

The following factors were considered in determining system requirements for depressurizing the Cape May formation for Quadrant IV excavations in the 35% Design:

- Uncertainty regarding the discontinuous nature of the semi-confining layer (where absent, sensitivity analyses indicated required pumping rates to depressurize the Cape May below an excavation could be twice the rate (i.e., approximately 40 gpm) compared to the rate calculated for sheeting keyed into the semi-confining layer;
- Variations in measured hydraulic conductivity in the Cape May Formation (an average value was used for the model);

- Requirements for dewatering to control the deflection of the South 6th Street excavation support system, requiring dedicated wells installed within the excavation to depressurize the Cape May Formation directly behind the system described in Section 3.4.5.3.1;
- Excavations using larger cells than 50-foot by 50-foot for cost efficiency and reduction of sheeting quantities; and
- Safety factors typically used in sizing pumps and treatment system components.

As a result of the above-referenced calculations and factors listed above, the 35% Design examined requirements for treating, managing and disposing of Cape May Formation groundwater with a system capacity of 100 to 200 gpm. During the 95% Design, further refinement of pumping required for larger cells than 50-ft by 50-ft, and for an excavation support system to protect against utility settlement along South 6th Street, will refine the expected range of pumping from the Cape May Formation for treatment system design.

Due to the differences in expected influent concentrations of groundwater pumped from the more contaminated shallow groundwater layer compared with the less contaminated Cape May Formation, and other discharge limitations, two separate treatment systems and disposal methods were examined for the 35% Design.

Arsenic is expected to be the primary constituent requiring pre-treatment. However, other parameters and constituents including total suspended solids, total dissolved solids, certain metals (e.g., iron) and VOCs will also likely affect the design and selection of the pre-treatment technologies and units. Because of these combinations of constituents, different components may be necessary to treat groundwater extracted from the two different water-bearing layers.

3.4.8.1.1 Shallow Groundwater

The shallow groundwater sampled in piezometers at several locations within the Site exhibits higher concentrations of arsenic, as compared to the groundwater in the Cape May Formation. Arsenic concentrations in shallow groundwater sumped from excavations are expected to range from about 4 to 16 mg/L, with an average concentration of about 7.5 mg/L. As described above, dewatering by sumping is expected to continue on a 24 hours per day, 7 days per week basis within the range of 25 gpm to 50 gpm.

During the 35% Design, Golder examined the feasibility of transporting treated shallow groundwater by trucking to the Camden County Municipal Utility Authority (CCMUA) treatment facility. The CCMUA has indicated capacity to accept dewatering effluent during the Phase 1 RA. The effluent limitations for acceptance at the CCMUA, located approximately 0.5 miles southwest of the Site, are provided in Appendix F. It appears that disposal of treated shallow groundwater pumped at a sustained rate up to approximately 25 gpm by trucking may be feasible, assuming:

- Using up to four 5,000-gallon capacity tanker trucks operating during normal business hours;
- A two-hour period for filling, transport and discharge at the CCMUA; and,
- Use of two to four FRAC tanks to contain pumped and treated shallow groundwater generated daily outside of normal business hours.

Pumping at higher rates with disposal by trucking would likely require transportation and acceptance of trucked water outside of normal working hours. The feasibility of such measures will be investigated during the 35% Design.

Because of the expected turbid nature of the pumped shallow water, treatment by bag filtration is expected. Treatment of suspended and dissolved concentrations of arsenic and other metals may also be necessary. This may be accomplished by further filtration and/or possibly ion exchange. The need for pre-treatment to remove VOCs will be examined during the 95% Design.

Based on discussions with vendors during the 35% Design, it appears that portable treatment systems utilizing the above-mentioned technologies are commercially available and can be contained within the Site at the location shown in Drawing 3 (Section 3.4.8.2).

3.4.8.1.2 Cape May Groundwater

Groundwater sampled from SM-series monitoring wells screened in the Cape May Formation shows lower levels of arsenic and VOC contamination compared to the shallow groundwater (PDI Report: Golder, 2013). The use of well points to collect the Cape May Formation groundwater will also result in influent that is lower in turbidity than the shallow groundwater. Consistent with observations during prior pumping tests, well point extraction will likely generate high flows of relatively clear water exceeding the practical limitations of management by trucking to the CCMUA during Quadrant IV remedial excavations. Arsenic concentrations in Cape May groundwater extracted from beneath excavations in Quadrant IV are expected to range from about 0.5 to 2 mg/L, with an average concentration of about 1 mg/L, based on PDI monitoring well data. Because of the high rates of Cape May Formation groundwater generation, disposal via trucking off-site is not feasible, and alternatives to disposal by trucking were examined as summarized below and discussed in Section 3.4.8.2:

- The CCMUA via connection with the existing utility piping adjacent to the Site; or
- Injection/infiltration to on-site groundwater using a temporary infiltration pit as shown conceptually on Drawing 3, requiring a permit-by-rule discharge to groundwater approval per N.J.A.C 7:14A-7.5(b)3vi (authorization of discharges to groundwater for dewatering at a contaminated site).

3.4.8.2 Treatment and Disposal

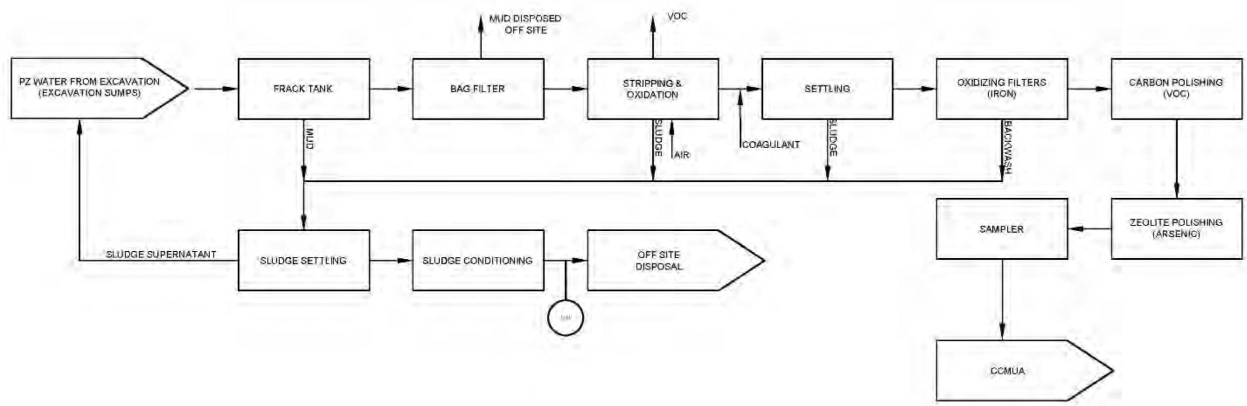
3.4.8.2.1 Effluent Disposal and Treatment – Discharge to CCMUA by Truck

Preliminary design analyses indicate that it will be feasible to pre-treat sumped shallow groundwater for disposal by trucking to the CCMUA. The system for shallow groundwater pre-treatment will likely include equalization tanks, filtration, solids removal equipment, and metals removal by filtration. The need for treatment to remove the concentrations of VOCs in shallow groundwater, and the need for arsenic polishing by removal of dissolved phase concentrations will be examined during the 95% Design, using results of treatability testing. The preliminary process flow diagram for this system is similar to that shown in Insert 1, except that units for carbon polishing for VOCs and zeolite polishing for arsenic may not be needed.

3.4.8.2.2 Effluent Disposal and Treatment – Discharge to CCMUA by Sewer

Treated effluent that is discharged to the combined sewer utility servicing the streets surrounding the Site will need to meet the criteria of both CCMUA and the City of Camden. As indicated in Appendix E, the effluent standards for acceptance into the combined sewer and storm water utility piping connected to the CCMUA treatment facility (CSO) are more stringent than the standards of the CCMUA treatment facility. The reasons for arsenic treatment standards that are more stringent than for potable water are unknown, and are currently being researched with the City of Camden. Furthermore, based on feedback from the City of Camden and United Water (who oversees operations of the CSO on behalf of the City of Camden), discharge to the CSO may periodically have to be interrupted to accommodate CSO bypass of the CCMUA treatment facility during rainfall events. Given the higher flow rates anticipated when pumping from the Cape May Formation, and the need to sustain pumping to maintain a stable excavation, weather-related interruptions of allowable use of the CSO is not considered a feasible disposal alternative. Further investigation of other options for City utility conveyance to the CCMUA that could avoid the stringent effluent criteria and the limitations for using the CSO will be performed during the 95% Design. To determine if it is feasible to convey water to the CCMUA via the CSO, groundwater treatability testing will be performed and the allowable capacity and condition of the CSO will be further investigated.

The system for shallow groundwater pre-treatment will likely include equalization tanks, filtration, solids removal equipment, and metals removal. The preliminary process flow diagram for this system is shown in Insert 1. Provisions for arsenic polishing and carbon polishing illustrated below will likely be required to achieve the City of Camden acceptance criteria provided in Appendix F. The feasibility of achieving the criteria will require treatability testing.



Insert 1. Preliminary Process Flow Diagram – Discharge to CCMUA

The final pre-treatment system and disposal method will be further evaluated and designed using treatability testing results during the 95% Design.

3.4.8.2.3 Effluent Disposal and Treatment - Discharge to Groundwater

Given the limitations imposed by the use of the City for use of the CSO, discharge of groundwater extracted from the Cape May Formation, treatment, and return to the Cape May Formation using an on-site infiltration pit has been considered. The current planned location for the infiltration pit is shown in Drawing 3 near the upgradient portion of the excavation area in Quadrant IV. The requirements and criteria for acceptability of a temporary discharge to groundwater include the following, as described in NJDEP guidance:

- Detailed description of the concentrations of all contaminants expected to be present in the discharge;
- Detailed explanation of why the groundwater treatment system (if proposed) would be appropriate for the discharge;
- Treatment system will treat the contaminants so as to prevent further degradation where groundwater standards are already contravened within a Classification Exception Area or otherwise identified area protected against groundwater use; and,
- Discharges to groundwater not to exceed 180 calendar days related to excavation dewatering at a contaminated site as part of a site-wide remedy.

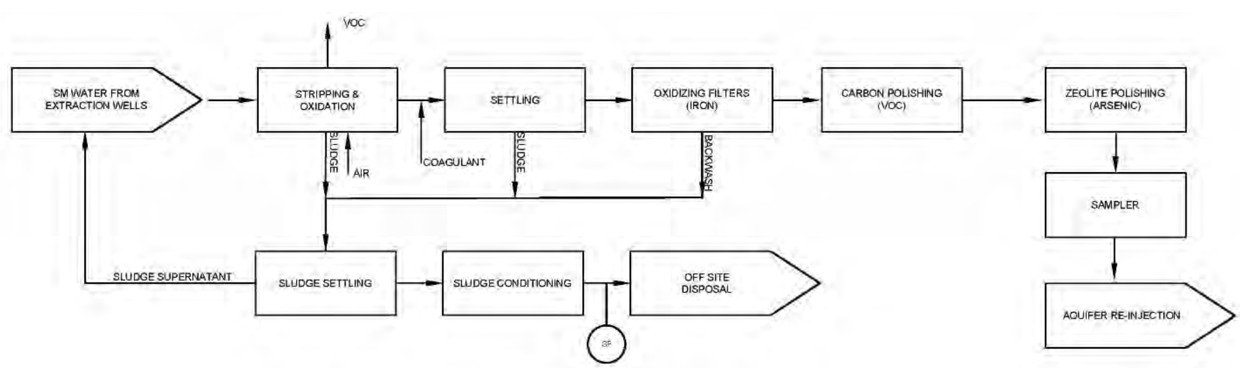
The following information will be required to prepare the application:

- Groundwater modeling results limiting the infiltration rate so as not to increase the rate of migration of current levels of COCs downgradient from the Site during the period of infiltration;
- Treatability testing to determine reduction of COC concentrations in extracted Cape May groundwater, compared with concentrations within and downgradient from the infiltration area;

- Development of discharge limits (concentrations and rate) to prevent further degradation of groundwater in the Cape May Formation beneath the Site; and,
- Monitoring program during the discharge (flow and effluent quality).

NJDEP's consent to re-inject the treated groundwater will be sought on the basis that the infiltrated and pretreated effluent will not adversely affect the quality of groundwater in the Cape May Formation beneath the Site, nor will it increase the rate or concentration of COC migration at the downgradient (i.e., Everett Street) boundary of the Site.

The conceptual process flow diagram for the pre-treatment system for the Cape May Formation groundwater for a discharge to groundwater system will include equalization tanks, solids removal equipment, metals removal and possible VOC and arsenic polishing treatment prior to infiltration as depicted in Insert 2. This system would operate only during pumping from the Cape May Formation for remedial excavations in the Quadrant IV area and as necessary to maintain the stability of the South 6th Street excavation support system (Section 3.4.5.3.1). Treatability testing and groundwater fate and transport modeling will be performed during development of the 95% Design to meet the requirements for permit-by-rule discharge to groundwater according to the requirements of N.J.A.C. 7:14A-7.5.



Insert 2. Preliminary Process Flow Diagram – Discharge to Groundwater

3.4.9 Excavation Water Treatability Testing Approach for 95% Design

After submittal of the 35% Design, groundwater treatability studies will be performed to aid in the design of the on-site groundwater pre-treatment systems. The treatability testing program will include the collection of representative groundwater samples from both the shallow groundwater and Cape May Formation, along with laboratory testing to determine technologies that can effectively treat the two groundwater sources to meet the applicable discharge criteria and to identify parameters that are not regulated but which could influence treatment process effectiveness. In addition to determining the optimal unit operations for treating the groundwater, treatability studies are vital to identify potential unit operations for ancillary treatment operations. Examples include sludge generation, sludge dewatering, and chemical receipt and storage. Other Site-specific factors also will be evaluated including the need for process water storage, utility requirements, waste storage and disposal options, approximate system footprints, and electrical power requirements.

Shallow groundwater samples for use in the treatability studies will be collected from test pits excavated into the Overburden at selected locations. Sampling from test pits is preferred over sampling from the existing shallow piezometers as the test pit samples should be more turbid and, therefore, more representative of the conditions that would occur during sumping from the excavation bottom. Cape May Formation groundwater samples for use in the treatability studies will be collected from a select number of existing SM-series monitoring wells.

The groundwater samples will be analyzed separately for COCs including those already identified above, parameters that are required by CCMUA and the City of Camden, as well as parameters that could inhibit treatment or create a high demand condition on the treatment units. Once the results are reviewed, the treatment processes will be refined. This will include evaluating whether one treatment system, or the two separate systems considered in the 35% Design, will be needed.

3.4.10 Confirmation of Remediation

The following sections present the fundamental approaches to demonstrating that materials requiring off-site disposal within the practical limits of excavation have been removed. The 95% Design will include a Sampling Plan and Quality Assurance Project Plan that will provide details on sampling procedures and analytical protocols including quality assurance/quality control sampling and data validation plans. All off-site laboratory testing will be performed by a NJ-certified laboratory. As described below, three approaches have been developed:

- Pre-delineation sampling of VOC Source Material near the Comarco Building;
- Visual confirmation of White Material removal; and
- Post-excavation sampling for VOC Source Material at locations other than near the Comarco Building, and for arsenic-containing MMC, where prior investigations have not already delineated locally the required limits of remediation.

3.4.10.1 VOC Source Material and PCB Impacted Overburden

Overburden samples collected during prior investigations have identified isolated areas that contained PCB concentrations exceeding the direct contact cleanup goal associated with current NJDEP requirements. As indicated previously in Section 3.4.6.1, PCB sample locations during prior investigations where concentrations exceed the 1 mg/kg direct contact cleanup goal will be excavated separately and segregated for consolidation and capping beneath an appropriate cap. Prior sample locations with PCB Direct Contact Cleanup Goal exceedances will be surveyed, and separate remedial excavation areas will be marked off in 25-foot square areas centered on the sample location. The fill materials within the marked areas will be excavated and segregated as described in Section 3.4.6.1.

Post-excavation sampling (sidewalls and bottoms) will be performed to determine if further excavation is needed to segregate PCBs in Overburden exceeding 1 mg/kg. Progressive excavations expanding vertically and/or laterally will occur until post-excavation sampling verifies the Overburden in the prior sample area does not contain PCBs above the Direct Contact Cleanup Goal of 1 mg/kg. After verification, excavation of remaining Overburden in the area to access deeper materials requiring off-site disposal will not require further segregation for PCBs.

Excavations to remove VOC Source Material will be initially performed within the limits of the VOC Source Areas (Drawing 2), determined using the PDI and other investigation results. Prior investigation samples that delineate the lateral and vertical extents of areas requiring material removal will be utilized, where possible. Remedial excavation areas (REAs) will be developed containing lateral excavation straight-segment boundaries facilitating excavation and sampling, within the interpolated VOC Source Area boundaries. The sizes of the REAs will consider material management and dewatering criteria reviewed in prior portions of the 35% Design. Development of initial excavation polygons extending to the deepest sample depth within the polygon area will be performed and laid out with survey control coordinates developed during the 95% Design.

Post-excavation sampling for VOC Source Materials and PCB concentrations will be performed in smaller REAs (i.e., less than 3,000 sf) at bottom spacing of 1 sample per 900 sf, or at least one bottom sample per REA. Sidewall samples will only be collected around the exterior perimeters of the VOC Source Areas (excluding the VOC Source Area perimeter adjacent to the Comarco Building), and around PCB areas to segregate materials containing PCBs exceeding 1 mg/kg. Larger bottom sample spacing and sidewall sample spacing will be examined for larger REAs within VOC Source Areas (to be identified during the 95% Design).

Samples for confirming removal of VOC Source Material will be collected for on-site gas chromatograph (GC) analysis (SW-846 Methods 8015 and 8021 modified for field use) allowing same-day turnaround, and archive split and preserved samples will be retained for potential off-site laboratory analysis. If 75% of GC results achieve the VOC Source removal goal, and no individual sample exceeds 10 mg/kg total TVOCs, 10% of the split and preserved post-excavation samples will be submitted for off-site NJ-certified laboratory analysis using a rapid turn-around to check the accuracy of the field GC. If the lab result is no more than 20% higher than the on-site GC, the on-site GC results will be judged to be accurate, and further laboratory testing will not be required. Overburden excavated beyond the limits of VOC Source Material to access deeper White Material or arsenic-containing MMC will be stockpiled for backfilling.

3.4.10.2 White Material

As indicated above and described in detail in the PDI Report (Golder, 2013), White Material at the Site contains arsenic at concentrations greater than 300 mg/kg. Therefore, all visibly identified White Material will be removed with the exception of: (a) material that is left in-place along the excavation boundary north of the three-story Ponte Equities Building, and (b) material being left in-place below the sidewalk along South 6th Street. As explained above, the White Material near the Ponte Equities Building will not be removed due to concerns with impacting the stability of the three-story building. The material along South 6th Street will not be accessible due to the temporary retaining structure to be installed along South 6th Street to support the street and utilities. The White Material left in-place in these areas is not accessible and so post-excavation sampling is not possible or necessary. In all other areas of the Site, White Material will be removed based on visual determination and no post-excavation sampling and laboratory testing will be performed.

3.4.10.3 Arsenic-containing MMC

When the targeted excavation depth has been achieved, base samples will be collected at a frequency of 1 sample per 900 sf and analyzed in the field using XRF, consistent with procedures implemented during the PDI. Ten percent of the samples will also be sent to a fixed laboratory for analysis of arsenic. No sidewall samples will be collected in the arsenic-containing MMC excavations. This is because the PDI determined that arsenic-containing MMC is located only directly beneath White Material. Therefore, the lateral limits of arsenic-containing MMC will be determined based on the lateral limits of White Material removal.

3.4.11 Excavation Backfill

Upon completion of excavation activities, the Site will be backfilled using a combination of Overburden from the Site that is not Source Material, processed concrete and masonry, and imported NJDEP-Certified Clean Fill materials.

Arsenic-containing MMC and White Material excavated within the Quadrant IV area will be replaced with imported NJDEP Certified Clean Fill, where the final excavation limits either expose the Cape May Formation or result in an unacceptable thickness of MMC material above the Cape May Formation (PDI Report: Golder 2013; Drawings 3, 4 and 5). The minimum required thickness of remaining MMC where use of NJDEP Certified Clean Fill as backfill will not be required will be determined during the 95% Design. The NJDEP Certified Clean Fill will be used to backfill the excavation promptly to above the level requiring continuing Cape May Formation dewatering to maintain excavation stability. Otherwise, excavated Overburden will be used as backfill. Processed concrete and masonry will be backfilled only above the shallow groundwater level at the time of excavation.

During the 95% Design, plans and cross-sections will be provided in drawings specifying limits where NJDEP Certified Clean Fill shall be used. Specifications will also be provided for backfill methods. Field density testing to measure compaction levels is not planned for construction quality control, with the exception of areas where NJDEP Certified Clean Fill is placed to support pavement/concrete caps, or to provide support for adjacent structure foundations where flowable fill is not used. In general, backfill materials will be placed to return the Site to the “unengineered” condition that existed before remediation. Backfill will be placed to the subgrade level required for the cap, in coordination with future development grading plans known at the time of the Phase 1 RA.

3.4.12 Engineering Controls

3.4.12.1 Capping

In accordance with the SOW, residual soil contamination at the Site within the Limits of Soil Remediation that exceeds one or more of the direct contact cleanup goals set forth in Appendix II, Table 6 of the ROD, will be capped. Capping will mitigate future direct contact exposure to soil/fill that exceeds the direct contact cleanup goals meeting one of the RAOs.

Capping for the Site (Drawings 6 and 7) will consist of a combination of existing pavements, sidewalks, and concrete slabs; imported clean soil or gravel, underlain by a geotextile demarcation layer identifying the boundary with materials containing COCs at concentrations above direct contact soil cleanup goals. Where materials containing PCB concentrations greater than 1 mg/kg have been consolidated as discussed in Section 3.4.6.1 above, an appropriate cap will be constructed. The following summarizes the capping within the Limits of Soil Remediation:

- Sidewalks bordering the Site along South Broadway, Everett Street, and South 6th Street provide a direct contact barrier in their existing condition. Where sections of sidewalk may require removal for remedial excavation (e.g., South Broadway), or are currently missing or heavily damaged, new sidewalk will be constructed per the detail on Drawing 7;
- Existing sidewalk, concrete and bituminous asphalt pavements cover the Comarco Property outside of the excluded footprint of the Comarco Building and provides a direct contact barrier in their existing condition. The 95% Design will check the current concept that no additional capping is required on the Comarco Property, by a more detailed survey of the existing surface conditions and lateral extents;
- Gravel/Soil capping with underlying demarcation geotextile will be constructed:
  - At the south side of the three-story Ponte Equities Building to the southern Limits of Soil Remediation;
  - Across the extent of the Martin Aaron Property except where existing concrete slabs or pavement is not disturbed by the Phase 1 RA or where an asphalt or concrete cap is constructed over consolidated PCB-impacted material; and,
  - Within the Scrapyard Property where not covered by existing pavement or concrete slabs.

The Group has been notified of future plans to develop portions of the Site. Plans specifics, including development grades and features, have yet to be identified. As expected in the RDWP, it is impractical during the Phase 1 RA to design a cap that can be easily adapted to possible cover and grade changes associated with future Site development, since such development plans have yet to be designed.

Therefore, the condition resulting after completion of the Phase 1 RA material removal and backfilling must be easily adaptable to possible grade and cover changes associated with pending Site development. The area shown on Drawing 6 within the limits of the “soil or gravel cap to be constructed” will be backfilled to a grade allowing surface water management without off-site runoff, and temporarily surfaced with an interim erosion and dust resistant temporary cover pending receipt of further information on development plans. The area will be protected against unrestricted access by a security fence, until the final cap is constructed. The 95% Design will provide further details on the interim cover, specifications for final cap construction, access restriction measures, and security measures and inspections that will be performed prior to final cap construction. It will also include a decision process for transitioning from the interim condition to the final cap construction.

The final cap will be inspected regularly after construction as part of the long-term Operations and Maintenance Plan (O&M Plan), and as required by deed notices/institutional controls.

3.4.12.2 Fencing

The perimeter Site fence will be repaired or replaced, as necessary, during implementation of the Phase 1 RA to secure the Site and provide protection against access to the interim cover by unauthorized use. After final cap construction, fencing will maintained as necessary to secure groundwater monitoring wells included in the IMP.

3.4.13 Institutional Controls

Institutional controls will be implemented to prevent disturbance of the capping and assure the maintenance of the cap (i.e., land use restrictions). Deed notices, prepared in accordance with the NJDEP Technical Requirements for Site Remediation, will be placed on the affected properties identifying the areas of soil contamination and the areas with engineering controls (e.g., capping).

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4.0 REMEDIAL ACTION PLANS

4.1 Interim Monitoring Plan for Groundwater

As provided in the RDWP, the Phase 1 RA includes groundwater monitoring prior to and after implementation of the Phase 1 RA. Section XII of the SOW states that an Interim Monitoring Plan (IMP) for groundwater will be developed and submitted to USEPA within 90 days following USEPA's Authorization to Proceed, which was given on January 16, 2008. However, as discussed in Section 3.0 of the RDWP, additional investigative work needed to be performed before the monitoring plan could be prepared. That work included, but was not limited to, the need to refine the CSM to account for the presence of MMC, and the need to obtain updated groundwater quality data for use in developing the IMP. This issue was reviewed with USEPA during a project meeting on February 6, 2008, during which USEPA concurred that the submittal of the IMP could be deferred until completion of the PDI. This concurrence was memorialized in a letter from the Project Coordinator to USEPA on February 26, 2008 (*de maximis*, 2008).

A monitoring well condition survey, well redevelopment, and three rounds of groundwater field testing and sampling and analyses (including arsenic, VOCs, geochemical and natural attenuation parameters) were performed during the PDI. In addition, the PZ- and SM-series wells were installed to monitor groundwater in both the shallow groundwater fill zone, and the deeper groundwater in the Cape May Formation, respectively. This information allowed for refinement of key components of the CSM and will allow development of a more effective IMP. The IMP will be prepared during the 95% Design following updates to the PDI Report in response to USEPA comments provided on August 29, 2013, and after USEPA approval of the PDI Report (anticipated by the end of 2013). This sequence of activities will allow the implementation of the IMP after the Phase 1 RA has been implemented (Post-Phase 1 RA monitoring), in accordance with the SOW. Groundwater monitoring completed during the PDI will provide baseline information to be used to monitor improvements in groundwater quality occurring after the Phase 1 RA.

As part of the IMP, a plan will be developed for the decommissioning of existing monitoring wells which are within the practical limit of soil excavation shown on Drawing 2. Well decommissioning activities will be performed by a New Jersey certified well driller prior to excavation activities. Prior to decommissioning of the wells, a synoptic round of water level information and groundwater quality data will be collected from the existing monitoring network. The well decommissioning plan will include 18 monitoring well locations (Drawing 1) which fall within the proposed boundaries of excavation (MW-1M, -1SM, -21SM, -12M, -14R, -14D, -15M, -5SM, -22SM, -16M, -9SM, -10SM, -13M, and PZ-1S, -3S, -4S, -5S, and -6S).

The IMP will also propose that after completion of the remedial excavation activities, new monitoring wells will be installed. A more limited network of wells screened in the UPRM will be proposed based on the existing data which suggests that there are no impacts to the UPRM above the New Jersey Groundwater

Quality Standards (NJGWQS). The limited network will serve as the vertical sentinel network. The current off-site monitoring well network will not be affected by construction activities and will be proposed to be maintained within the future IMP. The exact number and location of wells will be further refined within the IMP and discussed with USEPA.

The IMP will propose quarterly monitoring and annual reporting of groundwater from the newly installed monitoring network for a period of two years post-Phase 1 RA, as outlined in Section XII of the SOW.

4.2 Health and Safety Plan

The remedial action contractor is responsible for developing and implementing the Site-specific Health and Safety/Contingency Plan (HSCP). Prior to initiating remedial activities, a HSCP will be prepared in accordance with most recently adopted and applicable general industry (29 CFR 1910) and construction (20 CFR 1926) standards of the OSHA, U.S. Department of Labor, as well as other applicable federal, state, and local statutes or regulations. The HSCP provides general health and safety information to others who may be involved with the implementation of the Phase 1 RA.

4.3 Soil Erosion and Sediment Control Plan

The remedial action contractor will be required to submit a Soil Erosion and Sediment (E&S) Control Plan in conjunction with its construction sequencing. This E&S Plan will be required to meet the requirements of the Specifications, the New Jersey Standards for Soil Erosion and Sediment Control and the E&S Plan prepared for the Site by the Remedial Design and certified by the Camden County Soil Conservation District (CCSCD). Details of the specific E&S Plan requirements will be included in Section 02125 of the Technical Specifications, to be developed as part of the 95% Design.

4.4 Construction Quality Assurance Plan

A Construction Quality Assurance Plan (CQAP) will be prepared as part of the 95% Design. These quality assurance procedures will verify and document that the Phase 1 RA is completed in accordance with the requirements of the ROD and the approved design.

The CQAP will describe the following elements:

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the Remedial Action;
- Identification of proposed Construction Quality Assurance (CQA) sampling and testing requirements including the sample size, locations, testing frequencies, sampling and testing protocols, acceptance and rejection criteria, data documentation sheets, problem identification and corrective measures; and,
- Reporting and documentation requirements for CQA activities including daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation.

4.5 Site Management Plan

A Site Management Plan (SMP) will be prepared as part of the Remedial Action Work Plan (RAWP), and will include, at a minimum:

- Tentative identification of the RA Project Team (including, but not limited to the remedial action contractor);
- A final schedule for the completion of the RA and all major tasks therein, as well as a schedule for completion of required plans and other deliverables;
- Methodology for implementation of the Construction Quality Assurance Plan (developed during the 95% Design);
- Procedures and plans for the decontamination of construction equipment and the disposal of contaminated materials;
- Methods for satisfying permitting requirements;
- Discussion of the methods by which construction operations shall include the following:
  - Timing of and manner in which activities shall be sequenced;
  - Preparation of the area of the Limits of Soil Remediation, including security, utilities, decontamination facilities, construction trailers, and equipment storage;
  - Coordination of construction activities;
  - Site maintenance during the RA;
  - Coordination with local authorities regarding contingency planning and potential traffic obstructions;
  - Entry and access to the area of the Limits of Soil Remediation during the construction period(s) and periods of inactivity, including provisions for decontamination, erosion control, and dust control;
  - Identification of all off-site facilities to which Site material will be sent, and description, for each facility, of the proposed materials for disposal and method of management of those materials; and
  - Implementation of the photographic plan to document the progress of the remedial construction work;
- Discussion of construction quality control, including:
  - Methods of performing the quality control inspections, including when inspections should be made and what to look for;
  - Control testing procedures for each specific test. This includes information which authenticates that personnel and laboratories performing the tests are qualified and the equipment and procedures to be used comply with applicable standards;
  - Procedures for scheduling and managing submittals, including those of subcontractors, off-site fabricators, suppliers, and purchasing agents; and
  - Reporting procedures including frequency of reports and report formats;
- Procedures to be used to determine whether performance standards are being achieved, and reporting procedures and frequency for results of such testing.

4.6 Operation and Maintenance Plan

The goal of the O&M Plan is to maintain the effectiveness of the remedy by monitoring the integrity and/or performance of each component of the remedy. As such, inspections of the each component of the remedy will be performed regularly to verify their condition. The O&M Plan, including detailed inspection checklists, and measures to address deficiencies will be developed as part of the 95% Design.

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5.0 PERMIT EQUIVALENCIES AND APPROVALS

5.1 Anticipated Permit Equivalencies and Approvals

Permit equivalences will be required to allow the completion of construction activities. All required permit equivalencies will be addressed prior to commencement of any remediation construction activities. During the 95% Design, a pre-application meeting will be held with the USEPA and NJDEP to discuss the associated requirements to allow implementation of the remedy and to determine if lead times for reviews will affect the Phase I RA schedule.

The following permit equivalencies are anticipated:

- Permit-By-Rule Discharge to Groundwater (NJDEP);
- Individual Flood Hazard Area Permit (NJDEP);
- Treatment Works Approval (NJDEP);
- Individual NJPDES Permit (NJDEP);
- Off-site Rule (USEPA);
- Soil Erosion and Sediment Control (Camden County Soil Conservation District); and,
- Others permits and approvals to be identified during subsequent design phases.

5.2 Other Local Permits and Approvals

The remedial action contractor will be required to identify and obtain local permits and approvals (City and/or County) prior to implementing the Remedy. These permits and approvals may include the following:

- Electrical Permit;
- Building Permit;
- Sidewalk Opening Permit;
- CCMUA discharge application; and
- Others permits and approvals to be identified by remedial action contractor.

6.0 OTHER PROJECT CONSIDERATIONS

6.1 Noise

The nearest residential properties are located south of the Site across Jackson Street along South 6th Street and south of Jackson Street across South Broadway. Construction activity (excluding emergency work) in the City of Camden is limited to between the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on weekends and federal holidays, unless the activity can meet specific noise limits set forth in Chapter 371 of the City ordinance. The acceptable noise levels range between 40 and 65 decibels depending on type of property, time of day and location of measurement (i.e., indoor or outdoor). The buildings along the southern Site boundary (i.e., three-story Ponte Equities and Comarco Buildings) will act to attenuate noise, but provisions for noise control will still be incorporated into control of remediation activities, with particular attention to operations.

Phase 1 RA activities that generate high noise levels, such as sheet pile installation, will be performed during normal business hours when traffic in the area provides significant background noise levels. Some required activities associated with construction are necessary on a 24 hours per day basis such as those associated with dewatering (i.e., pumping, pre-treatment, etc.). Generators, pumps, and other equipment may be required to run constantly. The remedial action contractor will be required to use a variety of methods (e.g. low-decibel equipment), where practicable, when equipment is required to operate outside of normal business hours. Noise levels at the periphery of the Site will be monitored, as necessary, to verify that acceptable noise levels are not exceeded.

6.2 Air Monitoring and Dust Control

Air monitoring will be conducted along the Site perimeter and at the Comarco factory air intakes to monitor for potential exceedances of air quality standards and action levels that will be established during the 95% Design. Considerations during the design development will include the procedures and sampling frequencies prescribed in 29 CFR 1910.1018; National Ambient Air Quality Standard (NAAQS); Camden County's nonattainment status of NAAQS for particulate matter 2.5 micrometers or smaller (PM2.5).

Air monitoring stations will likely consist of particulate/dust meters to record emission levels with pre-determined action level alarm points. Prior to implementing the Phase 1 RA, pre-construction background dust levels will be monitored in order to establish a baseline condition. In addition, perimeter sampling for airborne arsenic, depending on activity and dust generation, will also be considered and addressed during the 95% Design.

Dust generation during implementation of the Phase 1 RA, such as during material crushing and processing or excavation, will be controlled by the application of water to moisten the material. Other control methods (e.g., erection of windscreens), may be submitted by the remedial action contractor subject to the Group's acceptance review.

6.3 Traffic Control

The remedial action contractor will be required to limit traffic to Everett and South 6th Streets and Atlantic Avenue to access Interstate 676 in order to minimize the impact of the Phase 1 RA to traffic on the South Broadway thoroughfare and the surrounding community. In addition, the remedial action contractor will be required to prepare a traffic control plan to safely and efficiently handle the flow of traffic through and around the Site. Further refinement to traffic control constraints and requirements will be developed as part of the 95% Design.

6.4 Long Term Operations, Monitoring & Maintenance Requirements

The long-term operation, monitoring and maintenance program will provide for the inspection, maintenance and monitoring of the effectiveness of the remedy. This will be accomplished through post-construction activities including routine inspections and maintenance of the remedial action components including:

- Capping materials;
- Fence and gates; and
- Signage.

In addition, certification of the engineering controls is required every two years by NJDEP in accordance with New Jersey's Technical Regulations for Site Remediation, and every five years under USEPA Superfund. As indicated above, an O&M Plan will be developed as part of the 95% Design.

7.0 PRELIMINARY PROJECT SCHEDULE

A schedule for implementation of the Remedial Design and the subsequent construction of the Phase I RA is provided in Figure 2. The schedule includes tasks completed through submission of the PDI Report, along with an estimated schedule for completion of remaining tasks including submission of this 35% Design Report, submission of the 95% Design and 100% (Final) Remedial Design Reports; permit equivalencies associated with implementation of the Phase 1 RA, implementation of the Phase 1 RA, final inspection of the Phase I RA, submission of the Phase I RA Remedial Action Report, and long-term operation and maintenance of the Phase 1 RA. The estimated durations of the various tasks are subject to change as the design is progressed and as additional tasks may be identified during the design that will require modification of the schedule.

The major tasks to be completed during preparation of the 95% Design include the following:

- Groundwater treatability testing and design;
- Resolution of feasibility of use of the City utility for conveyance of water to the CCMUA;
- Design of the South 6th Street excavation support system;
- Meetings with NJDEP, City of Camden, CCMUA, Camden County Soil Conservation District, and potentially other stakeholders in connection with permit equivalencies and associated schedules for review;
- Preparation of geotechnical monitoring programs for protection of structures and utilities, and coordination with associated entities for such programs;
- Preparation, submission and review of permit equivalency applications;
- Approval of permit equivalency applications by various agencies; and,
- Further development of the design concepts presented in the 35% Design.

The schedule provided in Figure 2 contains a number of steps that are out of the control of the Group and its designer. Because of such uncertainties, and because of constraints and inefficiencies associated with beginning excavations requiring above-ground water treatment and management during winter conditions, it is currently anticipated that implementation of the source excavation portion of the remedy will commence in Spring 2015 and can be completed in 2015. A more detailed schedule for implementation of the Phase 1 RA will be provided with the 95% Design.

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8.0 PRE-FINAL REMEDIAL DESIGN REQUIREMENTS

8.1 Drawings

Additional drawings will be prepared as part of the 95% Design to reflect the level of detail necessary to secure the required permit equivalencies. These drawings will include:

- Plan and cross-section views showing REAs for VOC Source Material, White Material and arsenic-containing MMC, with tabulated initial cut depths and estimated initial cut quantities for each REA. Separate REAs will also be shown for segregation of PCBs exceeding the 1 mg/kg Direct Contact Cleanup Goal, along with estimated quantities and proposed consolidation area(s);
- Further detail of sequential layouts of staging areas, stockpile areas, and on-site controls to avoid cross-contamination;
- Initial layout plans for pre-delineation and post-excavation samples (base and sidewall), including survey controls;
- Final cap subgrade grading plan with necessary interim cover controls;
- Final cap details and extents with survey controls for limits, and final cap grades where allowed by known development plans, including assessment of existing pavement areas, their adequacy for final caps, and any repairs or enhancements;
- Soil erosion and sediment control plans and details;
- Refinement of the South 6^{th} Street and Comarco 35% Design drawings for excavation support and protection of existing structures;
- Vibration, settlement and air monitoring program layouts;
- Groundwater treatment system(s) and discharge/disposal provision details;
- Requirements for Discharge to Groundwater, including the infiltration pit and monitoring program; and
- Details for fence, gates, sidewalk, signage and other miscellaneous construction elements.

The 95% Design (and 100% Design) drawings will be revised as needed to create a drawing set suitable for bidding, and ultimately for construction, with the requisite level of detail required to secure responsive bids from prequalified bidders.

8.2 Technical Specifications

A preliminary list of technical specifications is provided in Appendix G. The list includes general, sitework and concrete specifications for construction of the remedy. As part of the 95% Design these specifications will be developed in Construction Specification Institute (CSI) format to provide detail necessary to convey the requirements associated with implementing the Phase 1 RA. The specifications will include requirements for submittals, quality control testing, material properties and execution of the work.

8.3 Engineering Calculations

Engineering analyses and calculations will be expanded, refined and developed during the 95% Design. These include the following:

- South 6th Street shoring system;
- Vibration criteria/monitoring;
- Groundwater treatment and disposal systems;
- Groundwater modeling to support discharge to groundwater; and
- Mechanical tie-in to local sewer system (if such tie-in is found to be feasible).

Additional analyses and calculations will be added as warranted to support the design elements.

8.4 Material Disposal

The remedial design requires the off-site disposal of various materials including VOC Source Material, White Material, and arsenic-containing MMC. Additional materials generated during implementation of the remedy will also need to be disposed of off-site. These include large non-concrete/non-masonry debris segregated from the excavated Overburden, temporary construction materials (e.g., plastic covers, sand bags), decontamination wastes, and general trash. Each waste stream will be disposed of at an appropriately licensed facility acceptable to the Group and approved by USEPA. The remedial action contractor will be required in the RAWP to identify disposal facilities and provide documentation related to the facilities' regulatory status to receive a particular waste stream. The appropriate documentation will be submitted to USEPA for approval before materials are sent to any facility.

8.5 Review Steps from 35% Design to 95% Design

A number of significant activities must be completed to advance the design from the 35% Design to the 95% Design. These steps are listed below. Additional steps may be added as the design is developed.

- Groundwater treatability studies;
- Detailed deformation analysis of the South 6th Street Support system, including provisions for removal of said system without causing unacceptable settlement;
- Establish Site-specific groundwater quality standard for discharge to groundwater;
- Pre-application meetings for permit equivalencies;
- Establish air monitoring, vibration, and settlement action levels;
- Determine most cost-effective way of conveying treated groundwater to the CCMUA, via truck, CSO, or other utility and develop selected option in the design; and,
- Evaluation of CSO line integrity if this conveyance option is feasible.

In consideration of advancing the design from the 35% to the 95% level, interim progress meetings with USEPA to review progress on specific items may be appropriate. Such meetings will be discussed in connection with USEPA and USACE review of the 35% Design.

9.0 REFERENCES

CH2M Hill, 2004. Remedial Investigation Report, Martin Aaron Superfund Site, Camden, New Jersey, December 2004.

CH2M Hill, 2005. Draft-Final Feasibility Study Report, Martin Aaron Superfund Site, Camden County, New Jersey, July 2005

de maximis, inc. 2005. Summary of Historical Ownership and Uses of the Martin Aaron Superfund Site and Select Nearby Properties. March 2005.

Golder Associates, 2008. Remedial Design Work Plan, Martin Aaron Superfund Site, Camden, New Jersey, Operable Unit 1 – Phase 1 Remedial Action, August 2008.

Golder Associates, 2012. Technical Memorandum: PDI Scope of Work (Stage 2), Operable Unit 1 (Soil) Remedial Design, Martin Aaron Superfund Site, Camden, New Jersey, August 22, 2012.

Golder Associates, 2013. Pre-Design Investigation Report, Martin Aaron Superfund Site, Camden, New Jersey, Operable Unit 1 – Phase 1 Remedial Action, July 2013 (DRAFT).

L. Robert Kimball & Associates, 2000. Draft Remedial Investigation Report for Martin Aaron Site, Camden City, Camden County, New Jersey, June 2000.

Lockheed Martin, 2006. Soil Investigation of the Ponte Equities Site, WA #0-183, Final Trip Report, May 2006.

NJDEP, 2005. Letter of concurrence with the ROD, September 29, 2005.

NJDEP, 2007. Solid and Hazardous Waste Management Program Guidance for the Sampling and Analysis of Concrete Designated for Recycling, updated February 20, 2007.

NJDEP, 2010. Solid and Hazardous Waste Management Program Guidance for Characterization of Concrete and Clean Material Certification for Recycling, updated January 12, 2010.

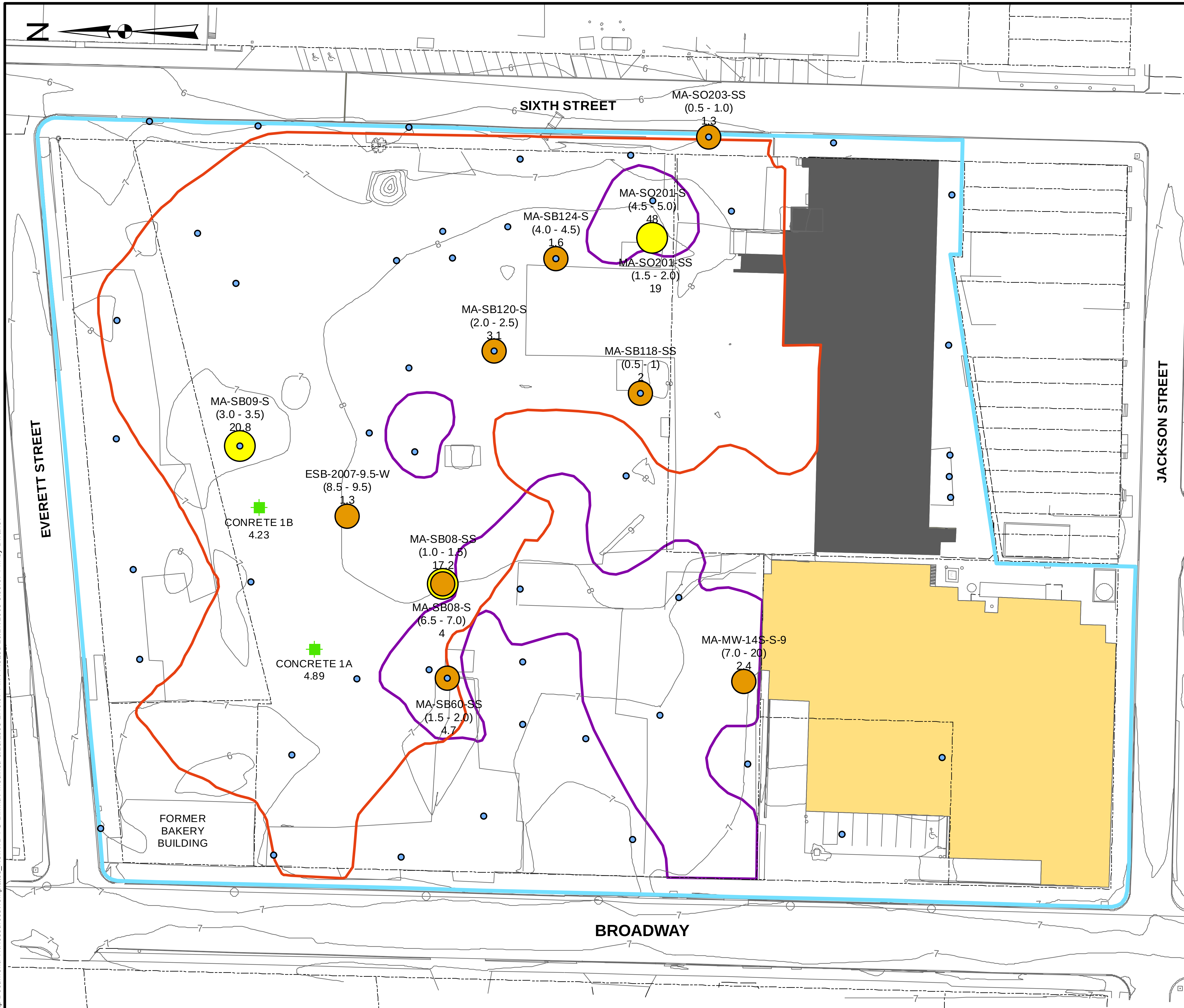
NJDEP, 2011. Site Remediation Program Alternative and Clean Fill Guidance for SRP Sites, version 2.0, updated December 29, 2011.

USDOJ, 2007. Consent Decree for Performance of Phase 1 of the Remedial Action for the Martin Aaron Superfund Site, August 2007.

USEPA, 2005. Record of Decision, Operable Unit 1 – Soil and Groundwater, Martin Aaron Superfund Site, City of Camden, Camden County, New Jersey, EPA/ROD/R02-05-023, September 2005.

USEPA, 2005a. Superfund Program Proposed Plan, Martin Aaron Superfund Site, July 2005.

Weston Solutions, Final Sampling and Analysis Report, Surface Soil and Building Interior Sampling, Ponte Equities Site, 1565-1575 South 6th Street, Camden, Camden County, New Jersey, March 1, 2006.



LEGEND

TOTAL DETECTED PCBs (MG/KG)

- 0.0 - 1.0
- >1.0 - 10.0
- >10.0 - <50
- LIMIT OF ARSENIC IMPACTED MATERIAL >300 PPM
- LIMITS OF SOIL REMEDIATION (APPROXIMATE) (ROD, CD)
- COMARCO
- PONTE
- LIMIT OF VOC IMPACTED MATERIAL
- BURIED CONCRETE STRUCTURE SAMPLE LOCATION (SEE NOTE 2)
- (0.5 - 1) SAMPLE DEPTH
- 2 TOTAL PCB CONCENTRATION

NOTES

1.) TOTAL DETECTED PCBs SUMMED FOR EACH LOCATION ARE SHOWN.

2.) LOCATIONS OF BURIED CONCRETE STRUCTURE AND SAMPLE LOCATION ARE APPROXIMATE, AND ARE BASED ON TEST PIT LOCATIONS. REFER TO THE PRE-DESIGN INVESTIGATION REPORT (GOLDER ASSOCIATES, 2013).

REFERENCES

1.) BASE MAP FROM DIGITAL FILE 09056-06-10-13.DWG ENTITLED "MAP OF SURVEY BLOCK 460, LOTS 1, 2, 3, 4, 26, & 29 CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY DATED JULY 28, 2009, PREPARED BY VARGO ASSOCIATES.

2.) PCB Data were exported from the Martin Aaron Project Portal Database, as managed by DDMS, on 08/27/13 and are based on 152 field sample IDs from 80 location IDs covering the years 2001, 2002, 2010, and 2013.

60 30 0 60
Feet

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT

MARTIN AARON SUPERFUND SITE
PRELIMINARY (35%) REMEDIAL DESIGN - OPERABLE UNIT 1
CAMDEN, NEW JERSEY

TITLE

PCB IMPACTS IN HISTORIC FILL

Golder Associates
Mt. laurel, New Jersey

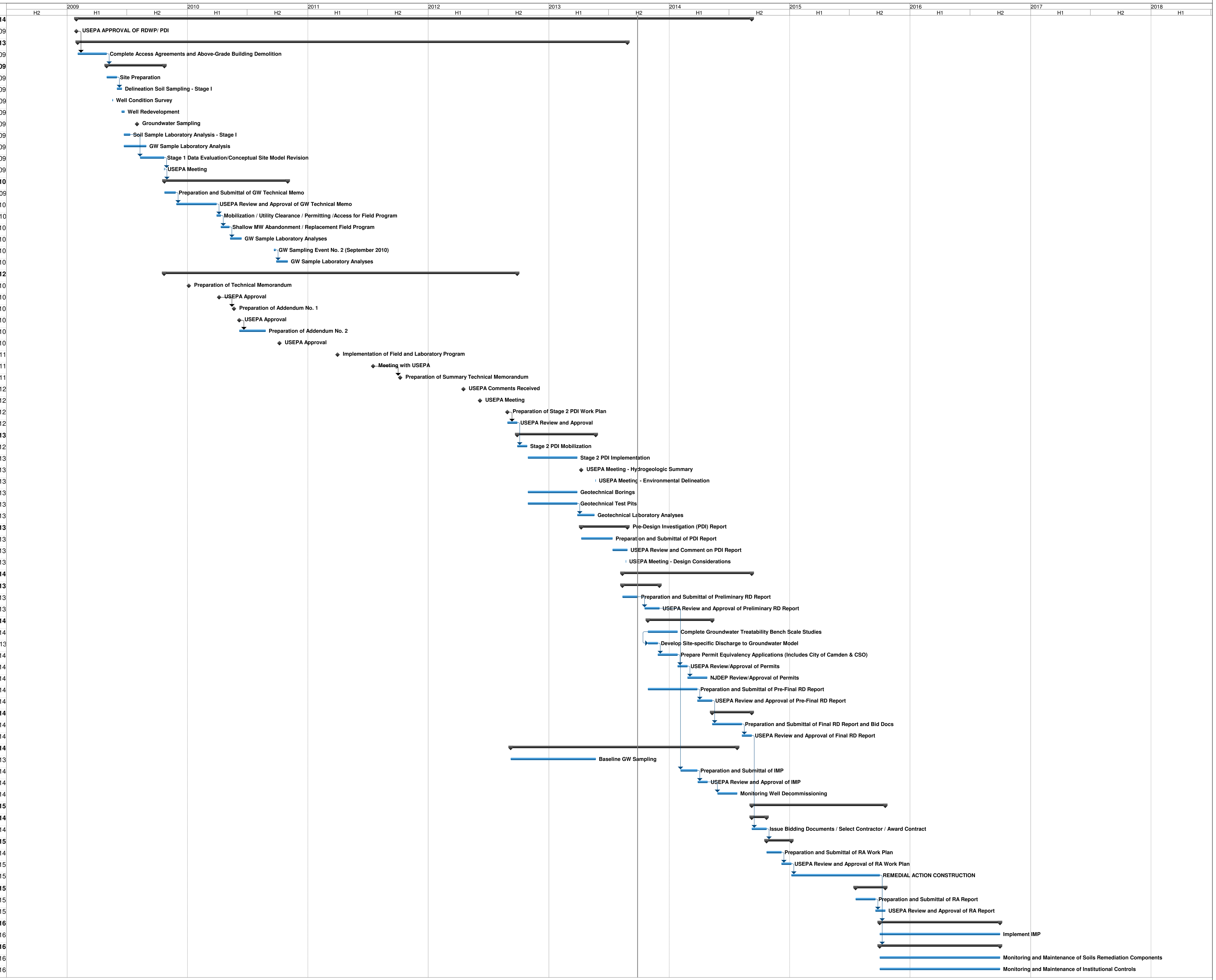
PROJECT No.		073-86114
DESIGN	LMC	09/27/13
GIS	AM	09/27/13
CHECK	LMC	09/27/13
REVIEW	AH	09/27/13

FILE No. 07386114E011
SCALE: AS SHOWN REV. 0

FIGURE 1

REMEDIAL ACTION
MARTIN AARON SUPERFUND SITE, CAMDEN, NJ

ID	Task Name	Duration	Start	Finish
1	**REMEDIAL DESIGN**	**2041 days**	**Thu 1/29/09**	**Sun 9/7/14**
2	USEPA APPROVAL OF RDWP/ PDI	0 days	Thu 1/29/09	Thu 1/29/09
3	**BUILDING DEMOLITION AND PRE-DESIGN INVESTIGATION**	**1660 days**	**Mon 2/2/09**	**Mon 8/26/13**
4	Complete Access Agreements and Above-Grade Building Demolition	88 days	Mon 2/2/09	Thu 4/30/09
5	**Stage 1 PDI**	**172 days**	**Fri 5/1/09**	**Thu 10/22/09**
6	Site Preparation	30 days	Fri 5/1/09	Sun 5/31/09
7	Delineation Soil Sampling - Stage I	15 days	Mon 6/1/09	Mon 6/15/09
8	Well Condition Survey	2 days	Mon 5/18/09	Tue 5/19/09
9	Well Redevelopment	9 days	Mon 6/15/09	Tue 6/23/09
10	Groundwater Sampling	5 days	Mon 7/27/09	Fri 7/31/09
11	Soil Sample Laboratory Analysis - Stage I	18 days	Mon 6/22/09	Fri 7/10/09
12	GW Sample Laboratory Analysis	67 days	Mon 6/22/09	Fri 8/28/09
13	Stage 1 Data Evaluation/Conceptual Site Model Revision	72 days	Mon 8/10/09	Wed 10/21/09
14	USEPA Meeting	1 day	Thu 10/22/09	Thu 10/22/09
15	**SM-Series Monitoring Well Program**	**370 days**	**Fri 10/23/09**	**Sun 10/31/10**
16	Preparation and Submittal of GW Technical Memo	34 days	Fri 10/23/09	Wed 11/25/09
17	USEPA Review and Approval of GW Technical Memo	120 days	Sat 11/28/09	Mon 3/29/10
18	Mobilization / Utility Clearance / Permitting /Access for Field Program	13 days	Tue 3/30/10	Sun 4/11/10
19	Shallow MW Abandonment / Replacement Field Program	26 days	Mon 4/12/10	Fri 5/7/10
20	GW Sample Laboratory Analyses	35 days	Mon 5/10/10	Sun 6/13/10
21	GW Sampling Event No. 2 (September 2010)	5 days	Mon 9/20/10	Fri 9/24/10
22	GW Sample Laboratory Analyses	35 days	Mon 9/27/10	Sun 10/31/10
23	**MMC Stratification, Geochemistry Program, and Arsenic Stability Program**	**1067 days**	**Thu 10/22/09**	**Wed 9/26/12**
24	Preparation of Technical Memorandum	71 days	Thu 10/22/09	Mon 1/4/10
25	USEPA Approval	0 days	Wed 4/7/10	Wed 4/7/10
26	Preparation of Addendum No. 1	45 days	Wed 4/7/10	Fri 5/21/10
27	USEPA Approval	0 days	Mon 6/7/10	Mon 6/7/10
28	Preparation of Addendum No. 2	80 days	Mon 6/7/10	Wed 8/25/10
29	USEPA Approval	0 days	Thu 10/7/10	Thu 10/7/10
30	Implementation of Field and Laboratory Program	242 days	Mon 8/2/10	Thu 3/31/11
31	Meeting with USEPA	0 days	Mon 7/18/11	Mon 7/18/11
32	Preparation of Summary Technical Memorandum	82 days	Mon 7/18/11	Fri 10/7/11
33	USEPA Comments Received	0 days	Tue 4/17/12	Tue 4/17/12
34	USEPA Meeting	0 days	Wed 6/6/12	Wed 6/6/12
35	Preparation of Stage 2 PDI Work Plan	57 days	Mon 7/2/12	Mon 8/27/12
36	USEPA Review and Approval	30 days	Tue 8/28/12	Wed 9/26/12
37	**Stage 2 PDI**	**238 days**	**Thu 9/27/12**	**Wed 5/22/13**
38	Stage 2 PDI Mobilization	30 days	Thu 9/27/12	Fri 10/26/12
39	Stage 2 PDI Implementation	150 days	Mon 10/29/12	Wed 3/27/13
40	USEPA Meeting - Hydrogeologic Summary	1 day	Mon 4/8/13	Mon 4/8/13
41	USEPA Meeting - Environmental Delineation	1 day	Wed 5/22/13	Wed 5/22/13
42	Geotechnical Borings	150 days	Mon 10/29/12	Wed 3/27/13
43	Geotechnical Test Pits	150 days	Mon 10/29/12	Wed 3/27/13
44	Geotechnical Laboratory Analyses	52 days	Thu 3/28/13	Sat 5/18/13
45	**Pre-Design Investigation (PDI) Report**	**140 days**	**Tue 4/9/13**	**Mon 8/26/13**
46	Preparation and Submittal of PDI Report	95 days	Tue 4/9/13	Fri 7/12/13
47	USEPA Review and Comment on PDI Report	45 days	Sat 7/13/13	Mon 8/26/13
48	USEPA Meeting - Design Considerations	1 day	Thu 8/22/13	Thu 8/22/13
49	**REMEDIAL DESIGN**	**392 days**	**Mon 8/12/13**	**Sun 9/7/14**
50	**Preliminary Remedial Design Report (35% Design)**	**112 days**	**Mon 8/12/13**	**Sun 12/1/13**
51	Preparation and Submittal of Preliminary RD Report	47 days	Mon 8/12/13	Fri 9/27/13
52	USEPA Review and Approval of Preliminary RD Report	45 days	Fri 10/18/13	Sun 12/1/13
53	**Pre-Final Remedial Design Report (95% Design)**	**195 days**	**Mon 10/28/13**	**Sat 5/10/14**
54	Complete Groundwater Treatability Bench Scale Studies	90 days	Mon 10/28/13	Sat 1/25/14
55	Develop Site-specific Discharge to Groundwater Model	30 days	Mon 10/28/13	Tue 11/26/13
56	Prepare Permit Equivalency Applications (Includes City of Camden & CSO)	60 days	Wed 11/27/13	Sat 1/25/14
57	USEPA Review/Approval of Permits	30 days	Sun 1/26/14	Mon 2/24/14
58	NJDEP Review/Approval of Permits	60 days	Tue 2/25/14	Fri 4/25/14
59	Preparation and Submittal of Pre-Final RD Report	150 days	Mon 10/28/13	Wed 3/26/14
60	USEPA Review and Approval of Pre-Final RD Report	45 days	Thu 3/27/14	Sat 5/10/14
61	**Final Remedial Design Report (100% Design)**	**120 days**	**Sun 5/11/14**	**Sun 9/7/14**
62	Preparation and Submittal of Final RD Report and Bid Docs	90 days	Sun 5/11/14	Fri 8/8/14
63	USEPA Review and Approval of Final RD Report	30 days	Sat 8/9/14	Sun 9/7/14
64	**GW MONITORING**	**687 days**	**Fri 9/7/12**	**Fri 7/25/14**
65	Baseline GW Sampling	258 days	Fri 9/7/12	Wed 5/22/13
66	Preparation and Submittal of IMP	51 days	Tue 2/4/14	Wed 3/26/14
67	USEPA Review and Approval of IMP	30 days	Fri 3/28/14	Sat 4/26/14
68	Monitoring Well Decommissioning	60 days	Tue 5/27/14	Fri 7/25/14
69	**REMEDIAL ACTION (tentative schedule)**	**405 days**	**Mon 9/8/14**	**Sat 10/17/15**
70	**REMEDIAL ACTION CONTRACTING**	**45 days**	**Mon 9/8/14**	**Wed 10/22/14**
71	Issue Bidding Documents / Select Contractor / Award Contract	45 days	Mon 9/8/14	Wed 10/22/14
72	**REMEDIAL ACTION WORK PLAN**	**75 days**	**Thu 10/23/14**	**Mon 1/5/15**
73	Preparation and Submittal of RA Work Plan	45 days	Thu 10/23/14	Sat 12/6/14
74	USEPA Review and Approval of RA Work Plan	30 days	Sun 12/7/14	Mon 1/5/15
75	**REMEDIAL ACTION CONSTRUCTION**	268 days	Tue 1/6/15	Wed 9/30/15
76	**REMEDIAL ACTION REPORT**	**90 days**	**Mon 7/20/15**	**Sat 10/17/15**
77	Preparation and Submittal of RA Report	60 days	Mon 7/20/15	Thu 9/17/15
78	USEPA Review and Approval of RA Report	30 days	Fri 9/18/15	Sat 10/17/15
79	**IMPLEMENT IMP**	**365 days**	**Thu 10/1/15**	**Thu 9/29/16**
80	Implement IMP	365 days	Thu 10/1/15	Thu 9/29/16
81	**OPERATION & MAINTENANCE**	**365 days**	**Thu 10/1/15**	**Thu 9/29/16**
82	Monitoring and Maintenance of Soils Remediation Components	365 days	Thu 10/1/15	Thu 9/29/16
83	Monitoring and Maintenance of Institutional Controls	365 days	Thu 10/1/15	Thu 9/29/16



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Notes: 1. Preliminary schedule, subject to change.

2. Tasks indicated in red font are beyond the control of the Group.

FIGURE 2
PRELIMINARY PROJECT SCHEDULE

(Revised Fri 9/27/13)

APPENDIX A

BUILDING CONDITION ASSESSMENTS – 3-STORY PONTE EQUITIES BUILDING

APPENDIX A-1

STRUCTURAL CONDITION ASSESSMENT MARCH 20, 2009

PONTE EQUITIES BUILDINGS 1 AND 3

POPOLI ENGINEERING INC., MARCH 27, 2009

POPOLI ENGINEERING, INC.
Structural Engineers

March 27, 2009

Golder Associates
200 Century Parkway, Suite C
Mount Laurel, PA 08054

Attention: Mr. Robert Valorio, P.E.

RE: Structural Condition Assessment
March 20, 2009 Inspection
Martin Aaron Superfund Site
Pontes Equities Buildings 1 and 3
Camden, New Jersey

Mr. Valorio:

Conclusions

The three-story Ponte Equities Building (Ponte 3) was inspected to determine the existing conditions prior to the demolition of the adjacent one-story Ponte Equities Building (Ponte 1). The Ponte 3 building is in a state of disrepair, with existing damage, and may experience some loss of mortar or loose concrete during the demolition process. The loss of these materials will not reduce the structural integrity of the building. A portion of the existing parapet has already been removed; the remaining parapet may also be at risk. A stack guy wire that attaches to Ponte 1 must be temporarily removed during demolition, and must be provided with a new, permanent anchorage point once demolition is complete.

Discussion

Ponte 3 is a three-story cast-in-place reinforced concrete slab and frame with masonry infill. The building is estimated to be circa 1920's or earlier. Ponte 1 is a one-story brick bearing wall building with wooden roof framing. Ponte 1 was added to the north side of Ponte 3 sometime after the original Ponte 3 construction.

Wooden framing from Ponte 1 is seated on top of the second floor Ponte 3 girders, or in the masonry walls of the Ponte 3 boiler room. Ponte 1 brick walls appear to abut the Ponte 3 walls, with no visible connections.

The demolition plan calls for cutting Ponte 1 free from Ponte 3 prior to the demolition of the building. I agree with this approach, which will isolate Ponte 3 from most vibrations. Despite this isolation, there is no guarantee that some elements of Ponte 3 may not become dislodged. The workmen should be cautioned not to take refuge in Ponte 3 during the demolition, and be aware of the possibility of some of the parapet falling during the work.

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PHONE: (215) 646-8949 • FAX: (215) 646-3189

The inspection of Ponte 3 concentrated on the east and north sides of the building. Similar conditions were observed in the interior of the building and on the south and west sides.

Columns and Exterior Girders

Most of the existing damage is concrete spalls from rebar corrosion. Where rebar was placed too close to the surface, the steel has corroded, expanded, and spalled the concrete cover. Most cracks are the result of this corrosion process. The concrete area around the crack could fall off at any time, and even the slightest vibration from the demolition process could be enough to break off these small (about 1 by 1 foot), thin concrete sections. Loss of this concrete is a potential hazard to personnel working below but does not reduce the structural integrity of the building.

One north wall column above the third floor is bulging out. On closer examination, it was determined that the bulge is a large section of concrete that is ready to spall off, not an actual structural failure where the column has buckled from an overload. This piece of concrete could also fall during the Ponte 1 demolition, but is not a concern for the overall integrity of the building.

Several columns in the ground floor passageways have damaged corners, most likely from forklift impacts

Boiler Room Walls

The boiler room is a small appendage on the north side of Ponte 3 that extends into the Ponte 1 area. The walls are constructed of multi-wyeth brick with pilasters. The walls and mortar appear to be in fair condition, with no significant damage. Demolition of Ponte 1 is not expected to create any additional concerns for these walls.

Masonry Infill

The original building had multi-wyeth masonry infill walls with windows. Most of the windows have been replaced by concrete masonry units (CMU). The walls are in fair condition, with some loose or missing mortar joints. Some loss of mortar may occur during Ponte 1 demolition, but these losses should be minimal and not affect the stability of the walls. Most glass, where present, is already damaged or broken.

Floor Framing

The floor framing system has reinforced concrete girders framing east-west between the columns, and a one-way floor slab supported by reinforced concrete joists spanning north-south. These concrete elements have similar damage from corrosion as described for the columns and girders (rebar spalls). In addition, fire and/or structural overload have spalled large sections of concrete from the bottoms of the beams and joists. Some of these sections are up to four feet long, and hang tenuously from the reinforcing bars. These elements are ready to fall inside the building, at any time, so even the slightest vibration may be enough to bring them down. As this material has already debonded from the rebar, the fact that it may drop off does not worsen the existing problem. This existing damage is a long-term problem for Ponte 3, but not an immediate threat to the integrity of the structure.

Roof Framing

The roof framing has a reinforced concrete girder-beam-slab system similar to the supported floors. The system has less damage than the supported floors, but does have some spalling and loose concrete from rebar corrosion. In addition, the bottom of the roof slab has frequent cracks and water stains running perpendicular to the parapet. This damage was likely caused by water build-up at the parapet. As with the floor framing, some spalled concrete could fall inside the building during Ponte 1 demolition, but the loss of the concrete would not threaten the integrity of the structure.

Parapet

The parapet is multi-wyeth brick construction with a half-pipe coping. Access to the roof was not available, and inspection of the parapet was based on visual observation with binoculars and long-range photos.

A section of the parapet at the northwest corner was removed in the past. Parapets, exposed to the elements on two sides, generally degrade faster than the walls built of the same materials. Given that a portion of the parapet failed in the past, it is not unreasonable to assume that some of the parapet may loosen or fall during Ponte 1 demolition. The loss of a portion of the parapet will not threaten the overall structural integrity of the building.

Stack and Guy Wires

Ponte 3 has a 3 foot (approximate) diameter steel stack that rises from the roof of the boiler house. The stack is tied back to the structure and also braced by guy wires. One of the guy wires is anchored to the roof of the Ponte 1 building. The guy will have to be removed during demolition.

The guy can be removed if the winds are not expected to exceed 40 miles per hour (MPH). The guy should be reattached to a temporary anchorage point each evening at the conclusion of the work. The temporary anchorage could be a heavy vehicle or any concrete block weighing at least 2 tons. If the guy wire needs to be extended, the new cable must match or exceed the size of the existing. A permanent anchorage point will need to be established after the demolition work is completed.

Summary

The Ponte 3 building has some existing damage and may experience some loss of loose concrete, mortar, or a portion of the parapet during demolition of Ponte 1. The loss of this material is a real hazard for workmen, but is not considered to reduce the structural integrity of the Ponte 3 building. The demolition contractor should be made aware of the worker hazards noted in this report.

Attached are selected photos documenting some of the typical defects.

Please call if you have any questions or need additional information.

Yours truly,

Albert P. Popoli

Albert P. Popoli
N.J.P.E. No. 30463

Attachments (Photos)

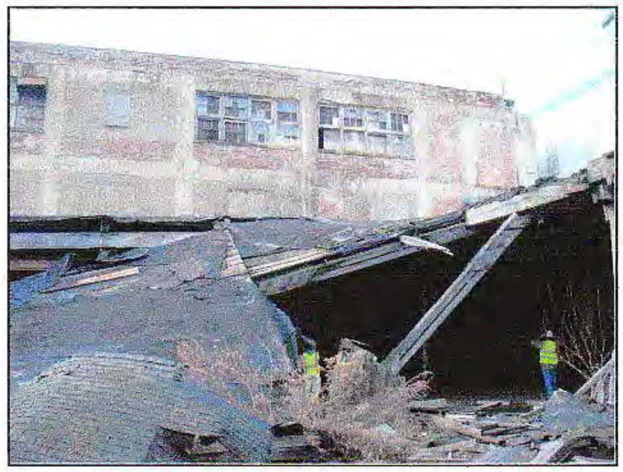
References:

1. Letter from Mr. Michael Wisniewski, P.E., ECOR, to Ms. Kelly Fifer, de maximis, inc, dated May 9, 2007.

Photograph 1: East Wall, Ponte 3

Photograph 2: North wall, Ponte 3, with Ponte 1 on the right. Note steel stack

Photograph 3: North wall from Ponte 1 (center).

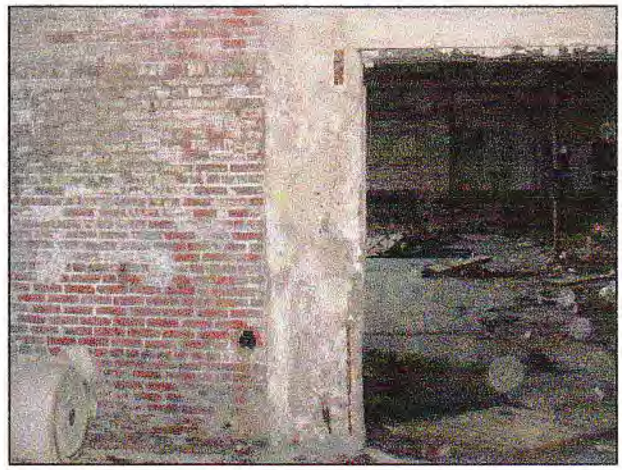


Photograph 4: North Wall from Ponte 1 (west side)

Photograph 5: Boiler Room West wall

Photograph 6: Boiler Room North wall

Photograph 7: Concrete spall at base of column



Photograph 8: Concrete spalls and forklift damage at column

Photograph 9: Column bulge, third floor

Photograph 10: Close-up of cracking at column bulge

Photograph 11: Girder damage – concrete spalling over bottom rebar and on web

Photograph 12: Concrete joist damage – large spall below bottom reinforcing

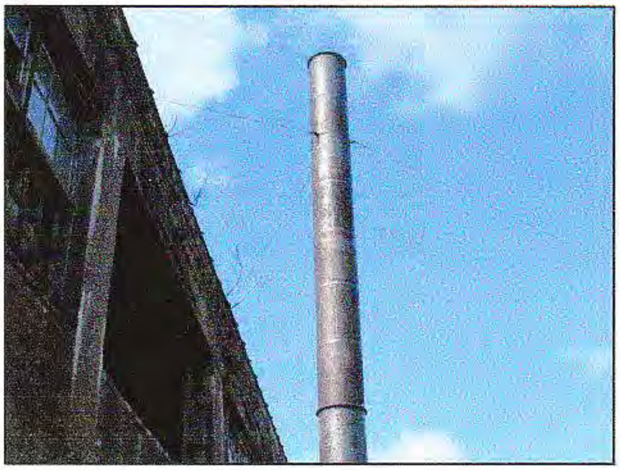
Photograph 13: Roof slab cracking, northwest corner

Photograph 14: Roof girder and roof slab damage

Photograph 15: Roof girder and roof slab damage

Photograph 16: Roof girder and slab damage

Photograph 17: Parapet damage, northwest corner



Photograph 18: Steel Stack. Guy wire to the right must be removed during demolition.

APPENDIX A-2

POST-DEMOLITION STRUCTURAL CONDITION ASSESSMENT APRIL 28, 2009

PONTE EQUITIES BUILDING 3

POPOLI ENGINEERING INC., MAY 12, 2009

POPOLI ENGINEERING, INC.

Structural Engineers

May 12, 2009

Golder Associates
200 Century Parkway, Suite C
Mount Laurel, PA 08054

Attention: Mr. Robert Valorio, P.E.

RE: Post-Demolition Structural Condition Assessment
April 28, 2009 Inspection
Martin Aaron Superfund Site
Pontes Equities Building 3
Camden, New Jersey

Mr. Valorio:

Conclusions

The three-story Ponte Equities Building (Ponte 3) was inspected to determine if demolition of the adjacent one-story Ponte Equities Building (Ponte 1) had caused any damage. Demolition of Ponte 1 took place between April 15 and April 23, 2009.

This letter follows the same format as the pre-demolition inspection letter dated March 27, 2009. All cracked and spalled areas observed on March 20th were re-inspected on April 28, 2009. No new cracks or loss of spalled concrete were observed.

The stack guy wire originally attached to Ponte 1 has been anchored to a large block of concrete. The concrete block is heavy enough to resist wind loads on the stack.

Discussion

Ponte 3 is a three-story cast-in-place reinforced concrete slab and frame with masonry infill. The building is estimated to be circa 1920's or earlier. Ponte 1 was a one-story brick bearing wall building with wooden roof framing. Wooden framing from Ponte 1 was seated on top of the second floor Ponte 3 girders, or in the masonry walls of the Ponte 3 boiler room.

<u>Columns and Exterior Girders</u>

Most of the existing damage is concrete spalls from rebar corrosion. No new cracks or loss of spalled concrete were observed. The third floor concrete column spall appears unchanged from the conditions observed at the March 20th inspection.

<u>Boiler Room Walls</u>

Removal of the Ponte 1 roof framing does not appear to have damaged any of the boiler room walls.

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Masonry Infill

No new masonry cracks or broken windows were observed. There is minor damage to some beam pocket bricks, but the damage is judged to be cosmetic not structural (Photos 1, 2).

Removal of the Ponte 1 masonry exposed a crack in the brick at the northwest corner of Ponte 3 (Photo 3). I recommend that this area be grouted to bond the brick and reduce water intrusion into the wall. This crack is not judged to have been caused by the demolition.

Floor Framing

No changes in the condition of the floor framing were observed. Previously identified concrete spalls are still bonded to the reinforcing.

Roof Framing

No changes in the condition of the roof framing were observed. Previously identified cracks appear to be unchanged.

Parapet

There is no evidence that any of the parapet fell during demolition, or changed in any way.

Stack and Guy Wires

The stack does not appear to have been damaged during the demolition. A large concrete block was added to serve as the guy anchor (the existing guy was reused). The concrete block is heavy enough to resist the New Jersey Building Code hurricane wind forces.

Summary

The Ponte 3 building did not experience any structural damage during the demolition of Ponte 1. Local cosmetic damage did occur at some of the brick pockets. Ground floor openings in the north wall have been sealed with concrete masonry.

Please call if you have any questions or need additional information.

Yours truly,

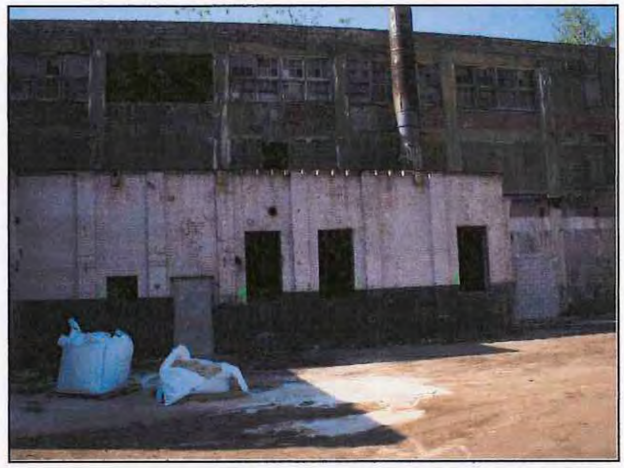
Albert P. Popoli
N.J.P.E. No. 30463

Attachments (Photos)

References:

1. Inspection Report, Popoli Engineering, Inc. letter to Golder Associates, March 27, 2009

Photograph 1: North Wall, Ponte 3



Photograph 2: North wall, Ponte 3, with Boiler Room walls in the foreground. Note steel stack

Photograph 3: North wall parapet, northwest corner

Photograph 4: Brick crack, Ponte 1 northwest corner

Photograph 5: Brick damage at beam pocket (worst case)

Photograph 6: Brick damage at beam pocket (typical condition, where present)

APPENDIX A-3

PONTE EQUITIES BUILDING

BUILDING CONDITION ASSESSMENT AUGUST 19, 2013

POPOLI ENGINEERING INC.

TO BE PROVIDED UNDER SEPARATE COVER

APPENDIX B

PRELIMINARY DESIGN GROUNDWATER DEWATERING MODEL

GROUNDWATER DEWATERING MODEL

In situ hydraulic tests were performed as part of the Stage II PDI in order to obtain the key hydrogeological parameters, such as hydraulic conductivities and storativities, used in the 35% Design Groundwater Dewatering Model. Golder conducted slug tests at selected wells screened in fill materials (PZ-Series wells) and conducted short term, constant rate pumping tests at selected wells screened in the Cape May formation (SM-Series wells). Data from the tests were utilized to obtain the hydraulic parameters in the shallow groundwater fill materials and Cape May formation presented in this model. Golder used HydroBench, a proprietary *in situ* test analytical tool for well test analysis, to analyze the *in situ* hydraulic tests. HydroBench is software package designed by Golder specifically for the derivative analysis of pressure response data from wells and boreholes where water is the ambient formation fluid. The software uses hydraulic properties of the tested wellbore and connected geologic formations to simulate pressure response derivative curves. By varying parameters to calibrate the modeled curves to match observed data the parameters of the system can be estimated. Parameters that can be calculated for the well and aquifer using HydroBench simulations consist of:

- Wellbore storage coefficient
- Well skin factor
- Transmissivity
- Storativity
- Flow dimension
- Initial static pressure in the aquifer
- Distance to boundary conditions (shell radius)

These parameters can be fixed to match observed values or free for the program to vary as necessary to fit the simulation. A multi-shell system can be modeled to evaluate changes in aquifer parameters (such as transmissivity) over both time and distance. The concept of a shell can be described as a radial zone of transmissivity surrounding the well. The assumptions, procedures used and calculations performed as part of the PDI are presented in greater detail in Appendix H of the PDI Report (Golder 2013).

Golder developed conceptual groundwater flow models using MODFLOW-SURFACT, a MODFLOW based finite difference groundwater flow model code, which is widely used in groundwater flow simulations. Golder used these groundwater models to estimate the dewatering rates associated with the 35% Design concept for exaction cells at the Site. The following describes the model discretization, assumptions, model scenarios, and results.

The model domain is an area of 200 x 200 feet with 100 rows and 100 columns and is established to minimize boundary effects when modeling a smaller conceptual excavation area. A conceptual excavation area of 50 x 50 feet was located at the center of the model domain. This conceptual excavation area is bounded by sheet piles on 4 sides, which were terminated at a depth of 24 feet below ground surface in a semi-confining layer found discontinuously in the Cape May Formation beneath the Site. Figure 1 shows the model domain. The model has six layers representing the Site hydrostratigraphy as depicted in Figure 2 and representative of prior investigation findings.

Figure 1: Model Domain

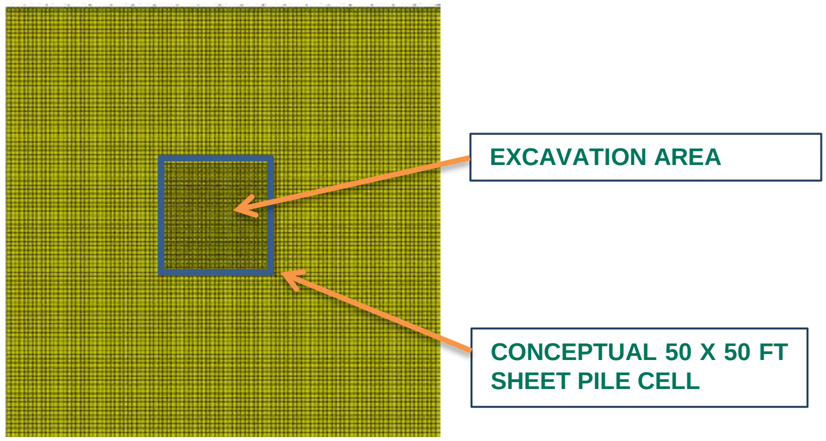
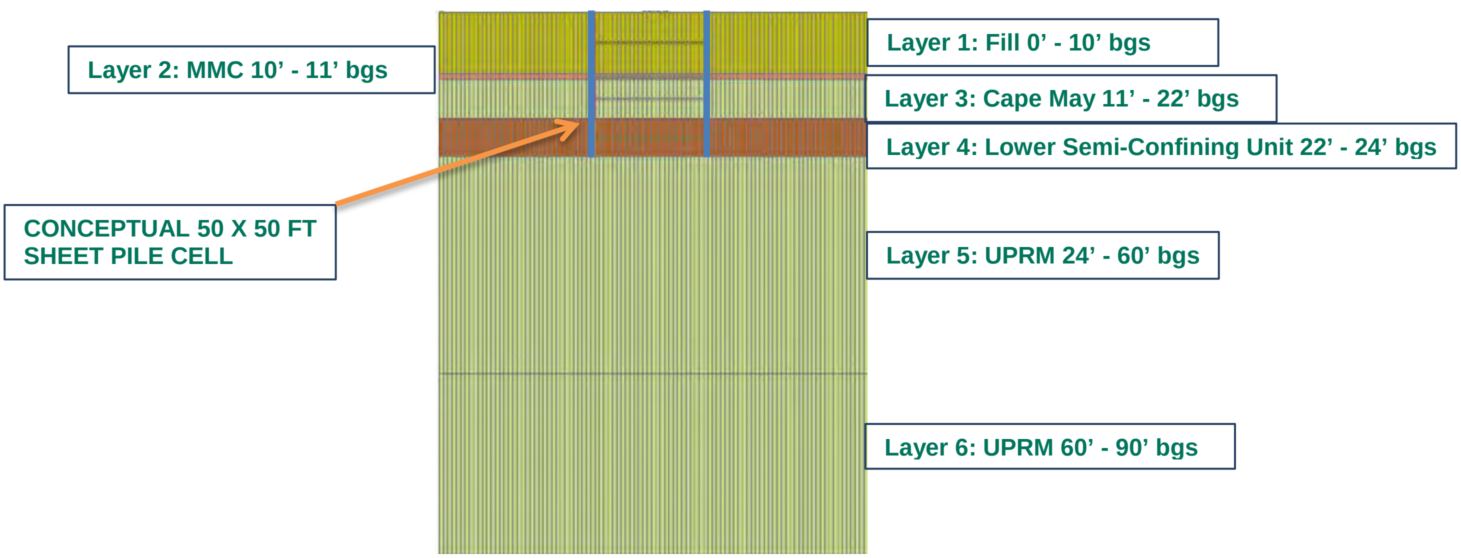


Figure 2: Model Layers



The average gradient in the model domain is 0.007 ft/ft. This gradient is the average of the gradients estimated based on the potentiometric surface data in the shallow groundwater and Cape May Formation that were observed on the Site during the PDI. The hydraulic parameters applied in the model, which are based on the hydraulic testing and lab test results, are shown in Table 1. The details of the hydraulic tests, analysis, and the analytical results were presented in the Appendix H of the PDI report (Golder, 2013). The recharge rate is 0.002282 $feet^3$ / day (i.e., 10 inches/year) based on the Groundwater Recharge for Camden County, New Jersey (NJGS, 2005).

Table 1: Hydraulic Parameters

Hydrostratigraphic Unit	Hydraulic Conductivity (Feet/Day)	Specific Storage (Feet^{-1})	Porosity
Fill	3.22	0.06	0.05
Meadow-Mat	0.01	0.01	0.01
Cape May	87.9	0.0004	0.3
Lower Confining Unit	0.5	0.01	0.01
Upper PRM	100	0.0004	0.3

Golder developed preliminary transient models to evaluate the dewatering rate for two potential excavation scenarios:

1. Excavation above Meadow-Mat unit (e.g., in Quadrants 1, 2 or 3 to remove shallow groundwater)
2. Excavation below the Meadow-Mat unit (e.g., in Quadrant 4 when the MMC is breached and depressurization of the Cape May Formation to below the excavation bottom)

These 35% Design model predictions represent the unit dewatering rate for a conceptual 50 x 50 feet (2,500 square feet) excavation cell. The model predictions are presented in Table 2.

Table 2: Model Predicted Dewatering Rates

Scenario	Initial Rate (cft/d)	Initial Rate (gpm)	Steady State Rate (cft/d)	Steady State Rate (gpm)
1	990	5	360	2
2	4,300	22	3,800	20

An appropriate factor-of-safety (1.25 to 2.0) should be applied to the estimated pumping rates to allow for the appropriate sizing of pumps and groundwater treatment equipment. The rates should be adjusted to account for cell sizes other than 50 x 50 feet as may be selected by the remedial action contractor. A more robust dewatering model will be required either during the 95% Design or by the remedial action contractor in order to complete the final design of the pumping and treatment systems.

In conjunction with excavation dewatering, two disposal options are being considered; discharge to the local WWTP and discharge to groundwater through an on-site infiltration pit. In support of the discharge to groundwater option, Golder developed a preliminary steady state model to evaluate the infiltration rate for a proposed infiltration pit which is hydraulically connected to the Cape May formation, i.e., the pit will be excavated through fill, White Material and MMC to expose the Cape May formation. The model predicted a potential infiltration rate of 175 gpm for a 50 x 50-foot pit, using the same hydrogeologic conditions modeled for dewatering. If discharge to groundwater is selected as a potential disposal option further modeling with be performed to design of the infiltration pit during the 95% Design with consideration given to potential impacts on on-going construction activities, mounding of groundwater and changes in flow patterns, and impacts to groundwater chemistry.

APPENDIX C

35% DESIGN CALCULATIONS FOR SOUTH 6TH STREET EXCAVATION SUPPORT SYSTEM AND EXCAVATION OFFSET FROM PONTE 3-STORY STRUCTURE

APPENDIX C-1

SOUTH 6TH STREET EXCAVATION SUPPORT SYSTEM

Golder Associates

SUBJECT PRELIMINARY EXCAVATION SUPPORT – 6TH ST.		
Job No. 073-86114 Ref. MARTIN AARON	Made by Checked AH Reviewed	Date 7/26/13 Sheet 1 of 18

OBJECTIVE: TO DEVELOP A PRELIMINARY SHEET PILE EXCAVATION SUPPORT SYSTEM, SUFFICIENT FOR CONCEPT AND COST ESTIMATION PURPOSES, TO SUPPORT SOUTH 6TH STREET DURING REMEDIAL EXCAVATION

METHOD: FIXED EARTH ANALYSIS DUE TO HEAVY (RIGID) SHEET PILING THAT WILL BE CONSTRAINED FROM EXCESS DEFLECTION

REFERENCES:

1. "STEEL SHEET PILING DESIGN MANUAL", PILEBUCK, INC., 1987.
2. NAVFAC DESIGN MANUALS – 7 SERIES, 1986.
3. "GEOTECHNICAL ENGINEERING INVESTIGATION MANUAL," R. HUNT, 1984.
4. "PRE-DESIGN INVESTIGATION REPORT, OPERABLE UNIT 1 – PHASE 1 REMEDIAL ACTION, MARTIN AARON SUPERFUND SITE, CAMDEN, NEW JERSEY" GOLDER ASSOCIATES INC., JULY 2013.
5. "PRINCIPLES OF GEOTECHNICAL ENGINEERING," B. DAS, 1994.
6. "FOUNDATION ENGINEERING HANDBOOK" H.F. WINTERKORN AND H.Y. FANG (EDS), 1975.
7. PROSHEET 2 (SHEET PILE ANALYSIS SOFTWARE), ARBED
8. PRODUCT CUT-SHEETS – PZ SHEET PILES, PILING PRODUCTS, INC.
9. "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES", AASHTO

Golder Associates

SUBJECT PRELIMINARY EXCAVATION SUPPORT - 6TH ST.

Job No. 073-86114 Ref. MARTIN AARON	Made by / Checked / Reviewed	Date 7/26/13 Sheet 2 of 18

ASSUMPTIONS:

1. SHEET PILE WALL WILL BE INSTALLED INBOARD OF WEST SIDE WALK OF SOUTH 6TH ST OR APPROXIMATELY 12 FEET FROM CURB

2. SOUTH 6TH STREET WILL REMAIN OPEN TO REGULAR TRAFFIC THROUGHOUT REMEDIATION

3. BECAUSE OF PROXIMITY OF UTILITIES AND CONSTRUCTION / CONDITION OF SOUTH 6TH STREET, DEFLECTION MUST BE LIMITED TO 1-INCH OR LESS

4. PARKED TRACTOR-TRAILERS WILL SURCHARGE WALL, ∴ USE STANDARD AASHTO SURCHARGE (2 FT OF 125PCF SOIL)

5. GROUNDWATER IN FRONT OF WALL LOWERED TO BOTTOM OF EXCAVATION. GROUNDWATER BEHIND IS CONSERVATIVELY ASSUMED AT TOP OF WALL (WORST-CASE CONDITIONS)

6. BASED ON REFERENCE 4 FINDINGS, MAXIMUM DEPTH OF REMOVAL IS 21 FEET BELOW EXISTING GRADE IN PROXIMITY TO WALL.

7. CROSS-SECTION ANALYZED IS AS SHOWN IN FIGURE 1 AND REPRESENTATIVE SOIL PARAMETERS AND LAYERING BASED ON REFERENCE 4 AND REFERENCES 2, 3, 5 AND 6. MEADOW MAT COMPLEX NEGLECTED

8. USE OF PROSHEET 2 SOFTWARE FOR SHEET PILE WALL ANALYSIS SUFFICIENT FOR PRELIMINARY CONCEPT AND COST ESTIMATION PURPOSES.

Rol No. G 203025930

Golder Associates

SUBJECT PRELIMINARY EXCAVATION SUPPORT - 6TH ST.		
Job No. 073-86114 Ref. MARTIN AARON	Made by [signature] Checked Reviewed AH	Date 7/26/13 Sheet 3 of 18

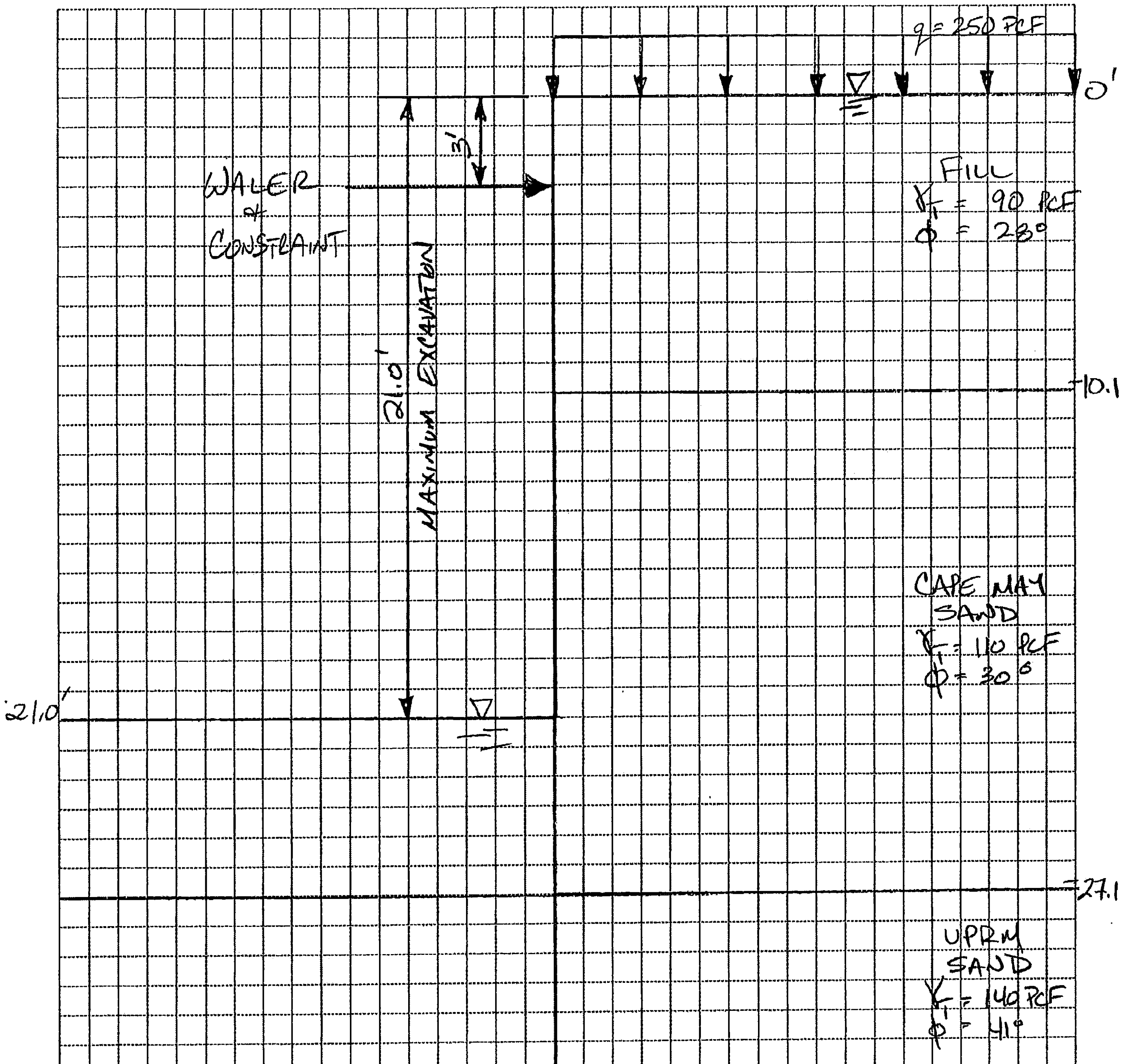


FIGURE 1

Golder Associates	SUBJECT PRELIMINARY EXCAVATION SUPPORT - 6TH ST		
	Job No. 073-86114 Ref. MARTIN AARON	Made by / Checked / Reviewed: JDA, AH	Date 7/26/13 Sheet 4 of 18

CALCULATIONS:

A PROSHEET 2 MODEL WAS DEVELOPED BASED ON THE PRIOR, LISTED ASSUMPTIONS AND CROSS-SECTION AS SHOWN IN FIGURE 1. ITERATIONS THAT VARIED SHEET PILE SECTION AND STEEL GRADE, BASED UPON TYPICALLY AVAILABLE SHEET PILES, WERE PERFORMED UNTIL A SATISFACTORY SECTION IDENTIFIED THAT RESULTED IN A REASONABLE COMBINATION OF DEFLECTION, ROTATION, EMBEDMENT DEPTH, AND REQUIRED CONSTRAINING FORCE. ATTACHED ARE THE PROSHEET OUTPUT FOR THE SATISFACTORY ITERATION.

IT MUST BE NOTED THAT PROSHEET 2 HAS A LIMITED BUILT-IN SHEET PILE DATABASE THAT ALSO CANNOT BE USER EDITED, THE SATISFACTORY SHEET PILE SECTION WAS DETERMINED TO BE AN AZ 28-700 IN A572, GRADE 50 STEEL. AN AZ-28-700 HAS A SECTION MODULUS OF 51.336 IN^3/FT AND A MOMENT OF INERTIA OF 465.874 IN^4/FT, AND NOT WIDELY AVAILABLE IN THE US MARKET. HOWEVER, THE AZ 28-700 IS COMPARABLE TO THE COMMON PZ-40 SHEET PILE MORE READILY AVAILABLE IN THE US. THE PZ-40 HAS A SECTION MODULUS OF 60.70 IN^3/FT AND MOMENT OF INERTIA OF 490.85 IN^4/FT (CUT-SHEET ATTACHED)

BASED UPON UTILITIES AND NECESSARY EASEMENTS, A TIE-BACK INSTALLATION IS FELT INFEASIBLE AT THIS TIME. WHILE BRACING THE WALL WITH INBOARD RAKERS IS FEASIBLE, IT IS FELT TO BE IMPRACTICAL TO EXCAVATION. THEREFORE, ADDITIONAL CONSTRAINT REQUIRED WILL BE PROVIDED BY WALERS AND KING PILES

Golder Associates	SUBJECT PRELIMINARY EXCAVATION SUPPORT - 6TH ST		
	Job No. 073-26114 Ref. MARTIN AARON	Made by JFB Checked Reviewed AH	Date 7/26/13 Sheet 5 of 18

SIZE WALER:

- FROM PROSHEET, 12,178 LB/FT CONSTRAINT REQUIRED.

- ESTIMATE MAXIMUM BENDING MOMENT (BETWEEN SIMPLY SUPPORTED AND 3-SPAN CONTINUOUS):

$$M_{MAX} = \frac{1}{8} \text{ TO } \frac{1}{10} T d^2$$

HERE, DISTANCE BTWN KINGS

HERE, REQUIRED CONSTRAINT

- ASSUME KINGS @ 20' SPACING

$$M_{MAX} = \frac{1}{8} \text{ TO } \frac{1}{10} (12{,}178 \tfrac{LB}{FT})(20 FT)^2$$

$$M_{MAX} = 487{,}120 \text{ TO } 608{,}900 \text{ FT-LB}$$

$$\therefore \text{ USE } M_{MAX} \cong 500{,}000 \text{ FT-LB}$$

- CALCULATE REQUIRED SECTION MODULUS FOR WALER:

$$S_{REQ} = \frac{M_{MAX}}{F_b}$$

ALLOWABLE BENDING STRESS OF STEEL FOR A572, GR 50 = 25 KSI

$$S_{REQ} = \frac{500{,}000 \text{ FT-LB } (12 \text{ IN/FT})}{25{,}000 \text{ LB/IN}^2}$$

$$S_{REQ} = 240 \text{ IN}^3/\text{FT}$$

A W14 X 145 HAS S = 232 IN³/FT ≅ OK

Golder Associates

SUBJECT PRELIMINARY EXCAVATION SUPPORT - 6TH ST.

Job No. 073-86114
Ref. MARTIN AARON

Made by GEB
Checked
Reviewed AH

Date 7/26/13
Sheet 6 of 18

KING PILES:

- BY INSPECTION OF WALER LOADS, A REINFORCED CONCRETE PIPE PILE CAN BE DESIGNED TO SUPPORT. HOWEVER, DETAILED ANALYSIS FOR SIZING IS BEYOND INTENT OF THIS CALCULATION.

CONCLUSION: IT IS FEASIBLE TO CONSTRUCT AN EXCAVATION SUPPORT SYSTEM ALONG SOUTH 6TH STREET TO SUPPORT ANTICIPATED LOADING WITH MINIMAL DEFLECTION TO BE PROTECTIVE AGAINST DAMAGE TO UTILITIES OR THE ROADWAY. A HEAVY SHEET PILE WALL BRACED WITH A CONTINUOUS WALER SUPPORTED BY CONCRETE-FILLED PIPE PILES HAS BEEN PRELIMINARILY EVALUATED.

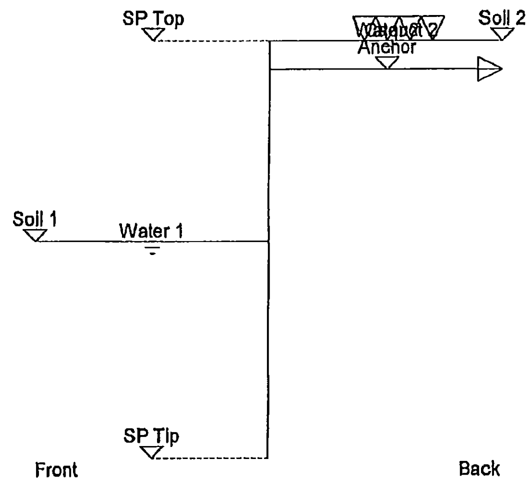
THIS CALCULATION HAS BEEN PREPARED BASED UPON PROOF-OF-CONCEPT AND COST ESTIMATION PURPOSES AND NEITHER REPRESENTS A FULL NOR OPTIMIZED DESIGN. A MORE THOROUGH AND COMPLETE DESIGN, INCLUDING CONSIDERATIONS TO OPTIMIZE EMBEDMENT DEPTH OF PRIMARY SHEET PILING AND BRACING, IS REQUIRED AND SHALL BE PROGRESSED DURING THE 95% DESIGN PENDING USEPA CONCURRENCE WITH APPROACH FOR REMEDIAL EXCAVATION ALONG SOUTH 6TH STREET PRESENTED IN THE 35% DESIGN

Ref No. G 203025920

#7/18

Geodata

	Unit
Sheet Pile Top Level [ft]	0.000
Sheet Pile Tip Level [ft]	43.571
Soil Level In Front [ft]	21.000
Soil Level behind [ft]	0.000
Anchorlevel [ft]	3.000
Water Level In Front [ft]	21.000
Water Level behind [ft]	0.000
Soil Surface Inclination In Front [Deg]	0.000
Soil Surface Inclination behind [Deg]	0.000
Caquot Surcharge In Front [kip/ft2]	0.000
Caquot Surcharge behind [kip/ft2]	0.250
Anchor Inclination [Deg]	0.000
Earth Support	Fixed



PG 8/18

Soil Layers

Layers in Front

	Layer Tip [ft]	Density Moist [kip/ft3]	Density Submerged [kip/ft3]	Kph	Phi [Deg]	Delta [Deg]	Cohesion [kip/ft2]
Layer 1	27.100	0.110	0.048	3.000	30.000	0.000	0.000
Layer 2	70.000	0.140	0.078	4.828	41.000	0.000	0.000

Layers behind

	Layer Tip [ft]	Density Moist [kip/ft3]	Density Submerged [kip/ft3]	Kah	Phi [Deg]	Delta [Deg]	Cohesion [kip/ft2]
Layer 1	10.100	0.090	0.028	0.361	28.000	0.000	0.000
Layer 2	27.100	0.110	0.048	0.333	30.000	0.000	0.000
Layer 3	70.000	0.140	0.078	0.208	41.000	0.000	0.000

PG 9/18

Pile Section

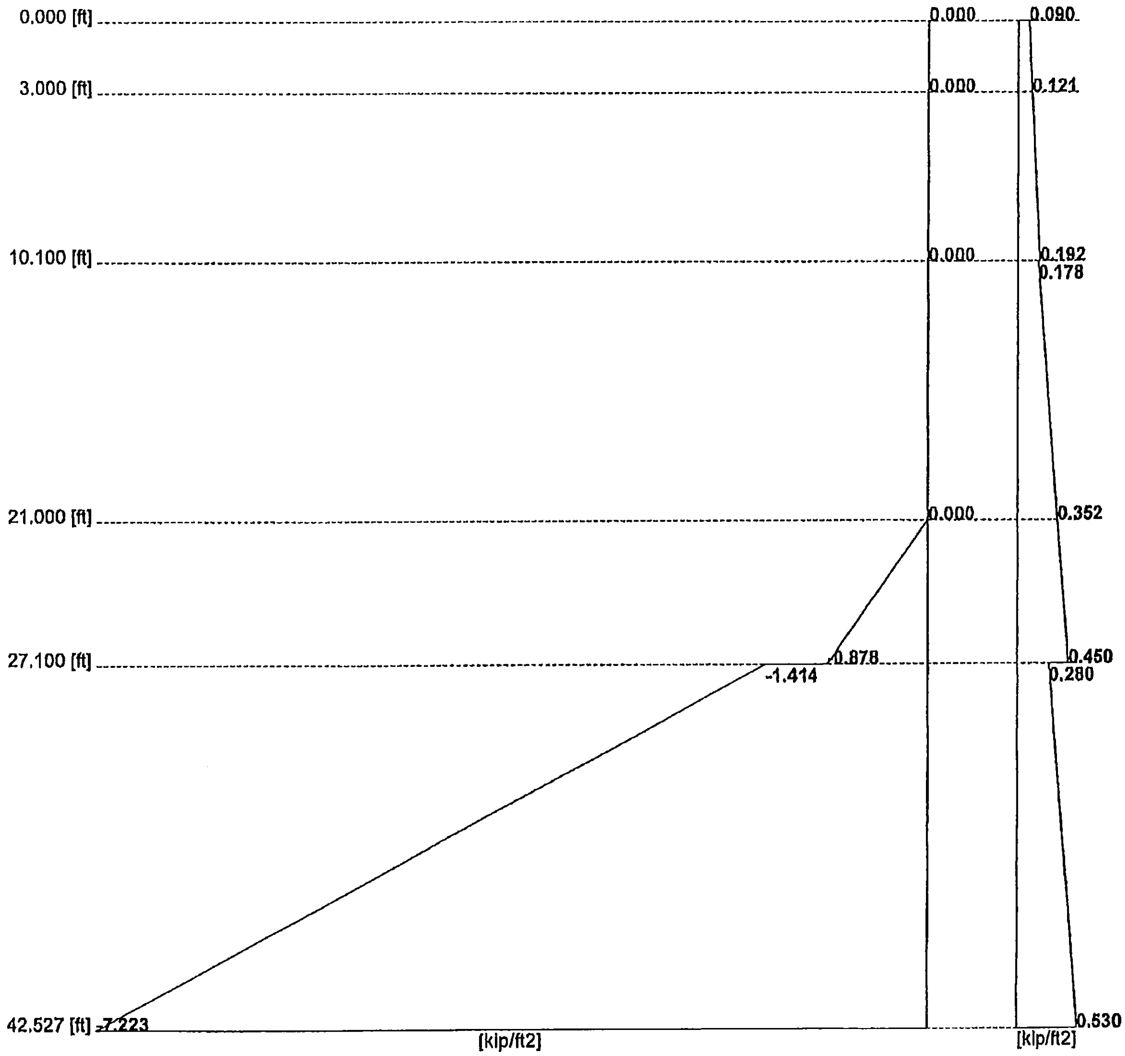
Name	AZ 28-700
Inertia [in4/ft]	465.874
Modulus [in3/ft]	51.336
Area [in2/ft]	9.459
Mass [lbs/ft2]	32.197
Steel Grade [lb/in2]	50000.000
Requested Safety	1.500

Pg 10/18

Pile Check

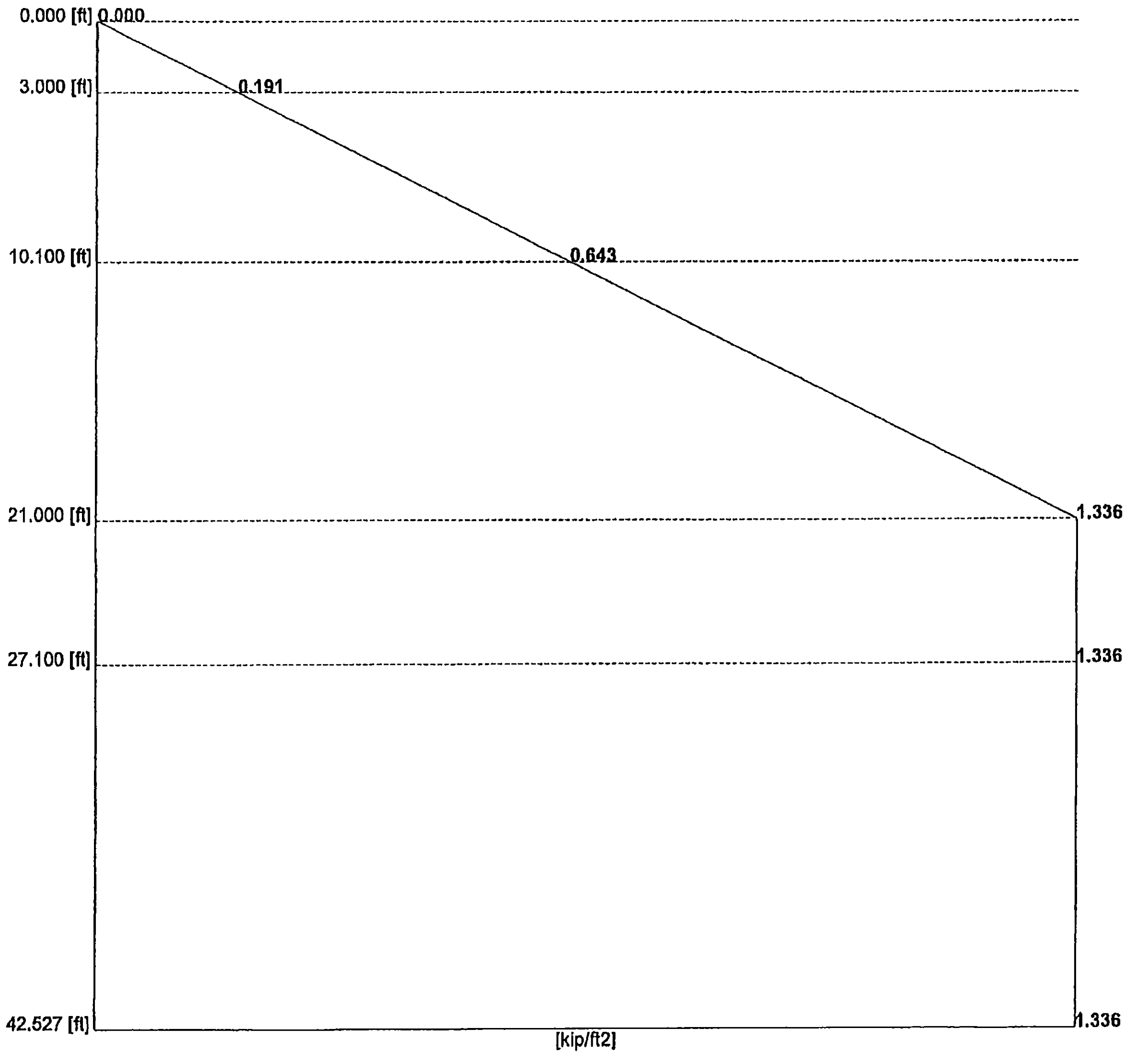
		Depth [ft]
Name	AZ 28-700	
Inertia [in4/ft]	465.874	
Modulus [in3/ft]	51.336	
Area [in2/ft]	9.459	
Mass [lbs/ft2]	32.197	
Steel Grade [lb/in2]	50000.000	
Minimal Moment [kipft/ft]	-97.039	16.662
Maxmimal Moment [kipft/ft]	70.312	36.122
Normal Forces at Max. Moment [kip/ft]	0.000	16.662
Normal Forces at Min. Moment [kip/ft]	0.000	36.122
Deflection at Min. Moment [ft]	-0.091	16.662
Deflection at Max. Moment [ft]	-0.008	36.122
Min. Stress at Min. Moment [lb/in2]	-22682.412	16.662
Max. Stress at Min. Moment [lb/in2]	22682.412	16.662
Min. Stress at Max. Moment [lb/in2]	-16435.170	36.122
Max. Stress at Max. Moment [lb/in2]	16435.170	36.122
Safety > Req. Safety = 1.500	2.204	
Sheet Pile Top Level [ft]	0.000	
Sheet Pile Tip Level [ft]	43.571	
Sheet Pile Length [ft]	43.571	
Included OverLength [ft]	1.044	
Vertical Equilibrium [kip/ft]	0.000	
Anchor Force (horiz.) [kip/ft]	-12.178	

Earth Pressure Diagram



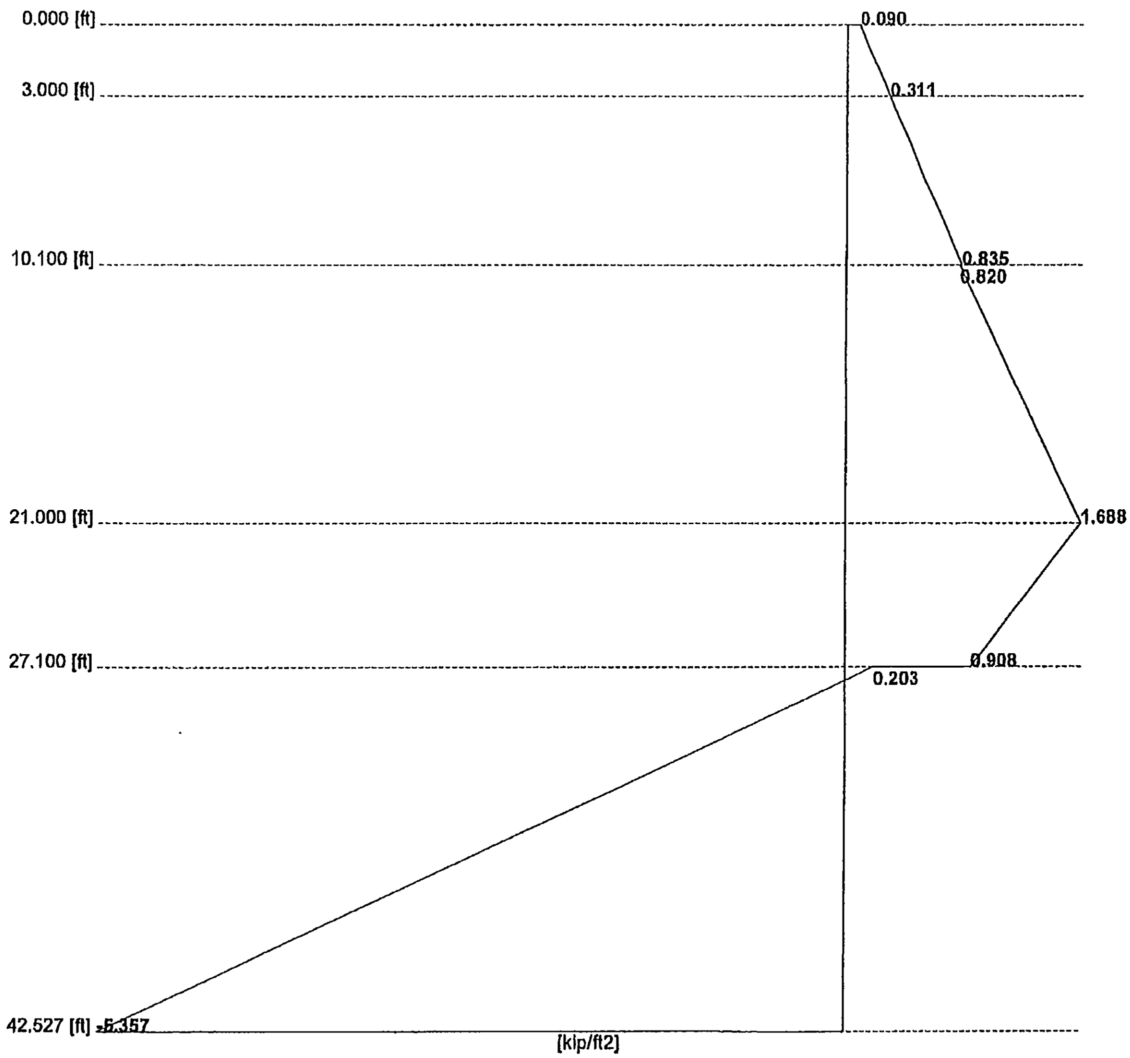
Pg 12/18

Water Pressure Diagram



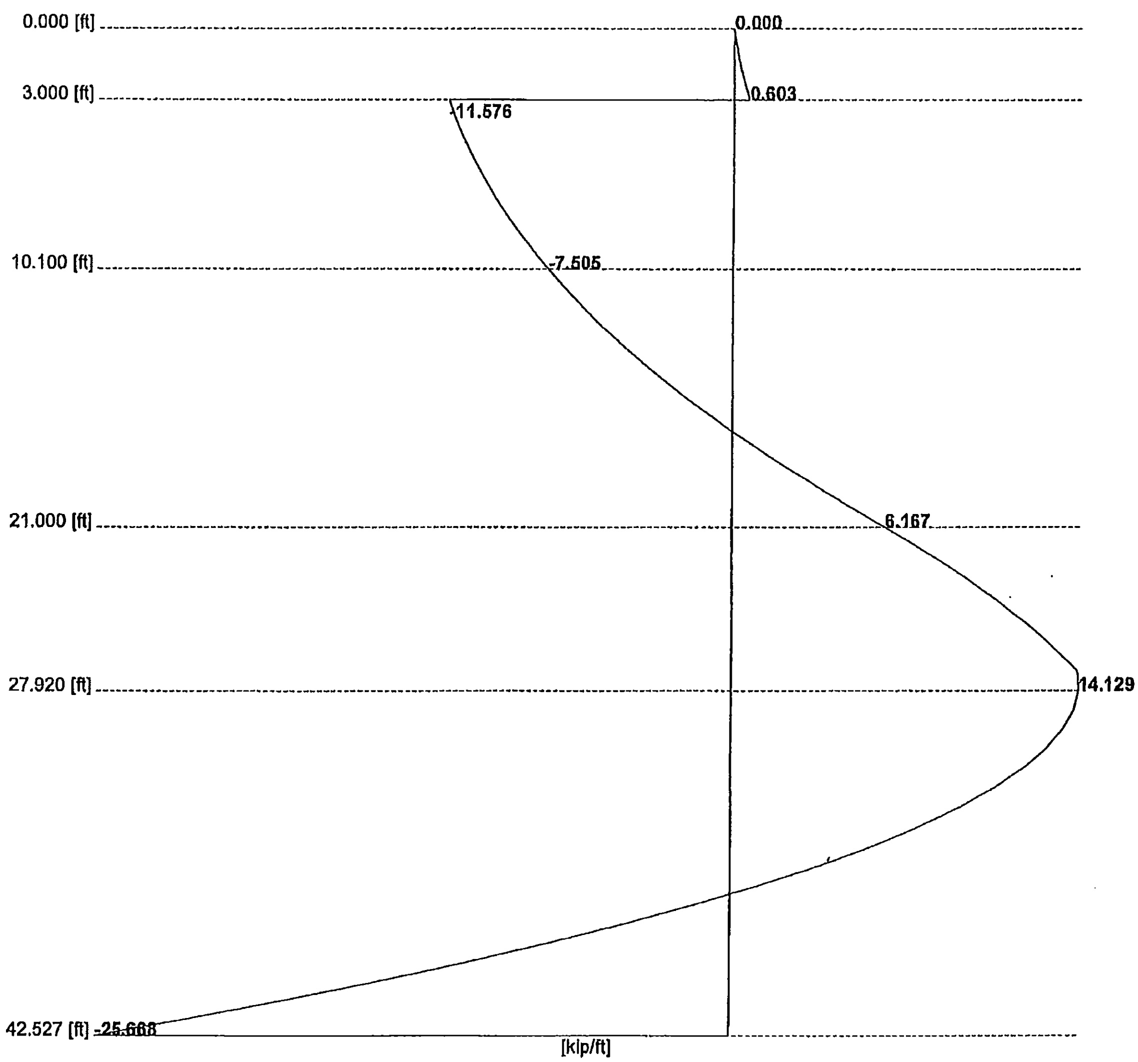
Pg 13/18

Total Pressure Diagram



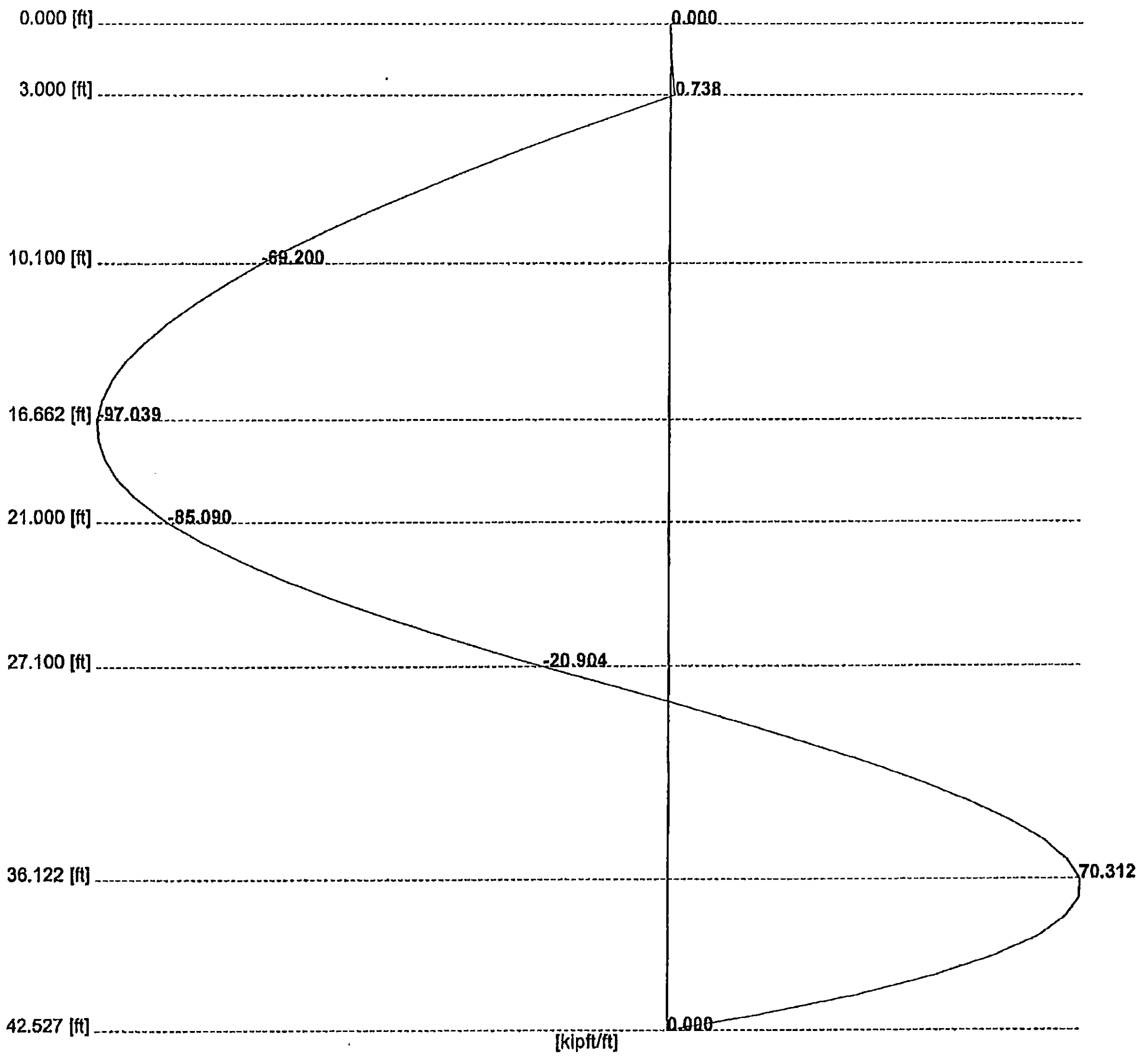
Cross Force Diagram

Pg 14/18



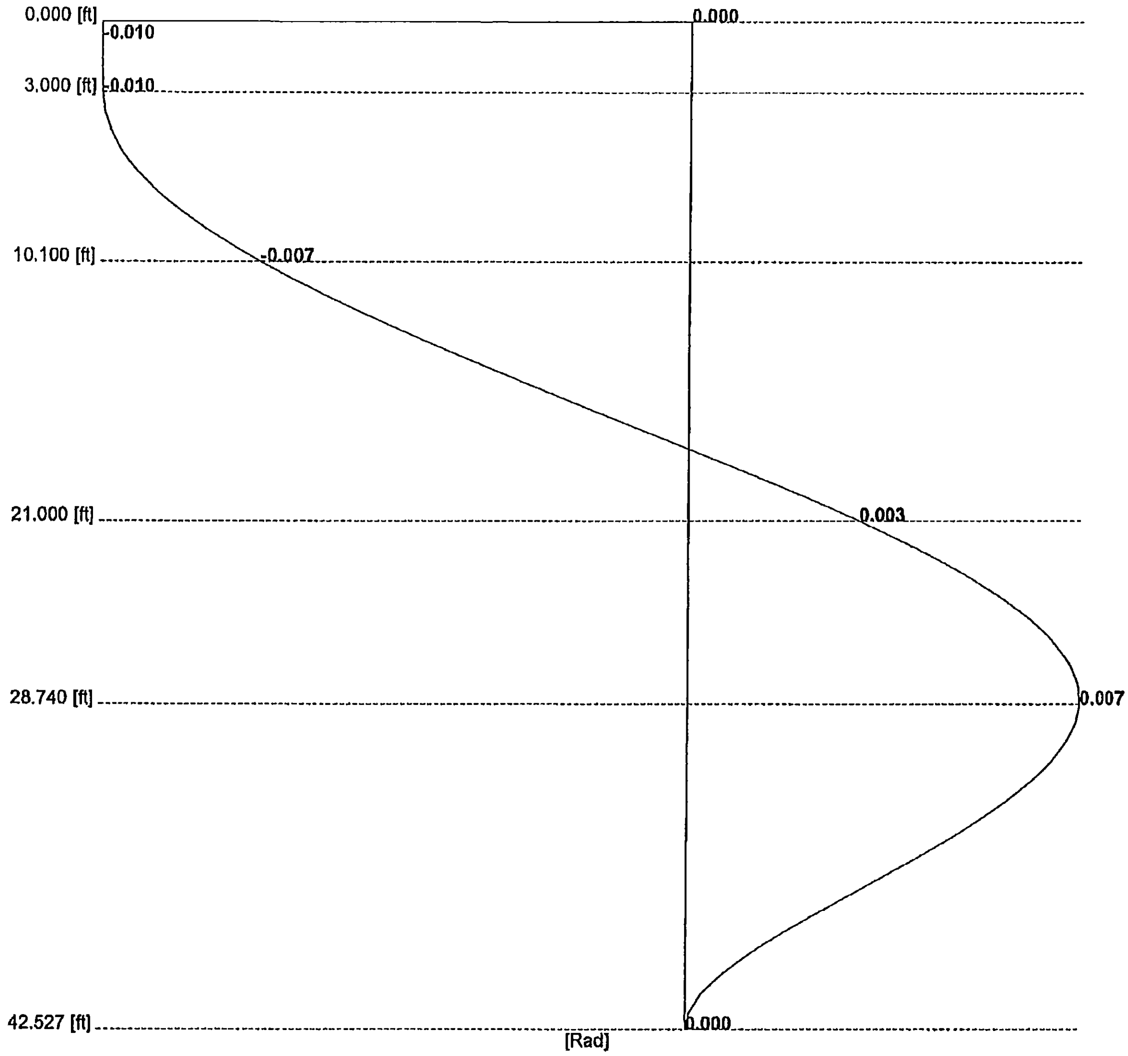
Pg 15|18

Moment Diagram



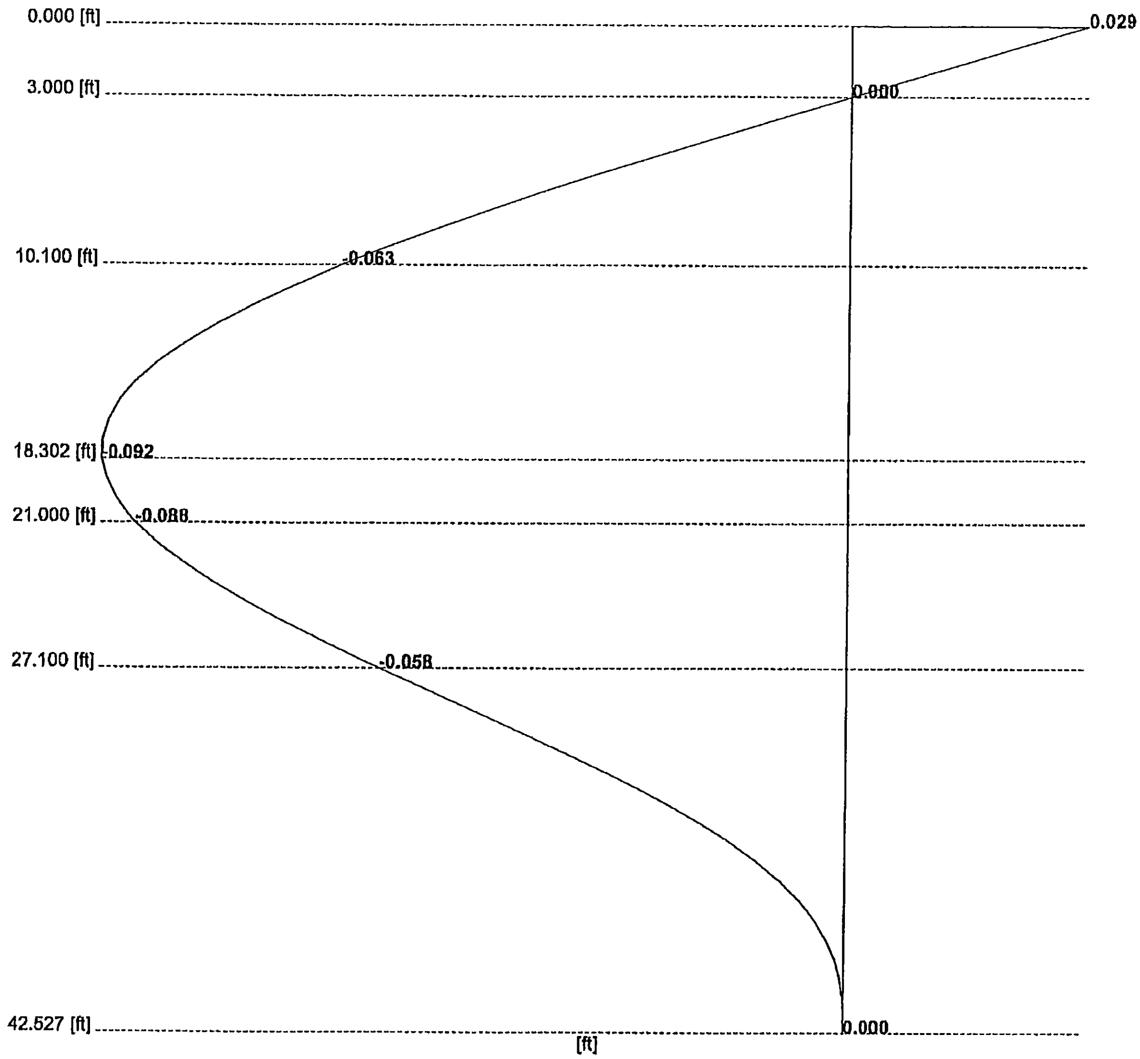
Pg 16/18

Rotation Diagram



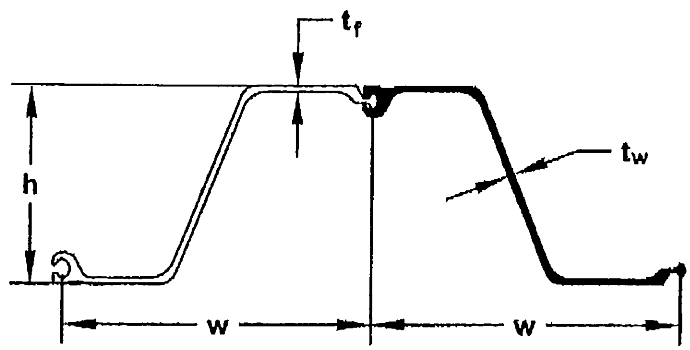
Deflection Diagram

Pg 17/18



Piling Products, Inc.

PZ-40 Sheet Piling



ASTM A572 Grade 50

Section	Width w in (mm)	Height h in (mm)	Thickness tf in (mm)	Cross Sectional Area in^2/ft (cm^2/m)	Weight Pile lb/ft (kg/m	 Wall lb/ft^2 (kg/m^2	Section Modulus in^3/ft (cm^3/m)	Moment of Inertia in^4/ft (cm^4/m)	Coating Area Both ft^2/ft (m^2/m)	Coating Area ft^2/ft^2 (m^2/m^2)
PZ-40	19.70 500	16.10 409	0.600 15.21	-	65.60 97.60	40.00 195.30	60.70 3263	490.85 67000	5.37 1.64	1.64 1.64

Piling Products, Inc.

945 Center Street * Green Cove Springs * Florida * 32043

Certified DBE/WBE

(904) 287-8000 Fax (904) 529-7757

ppisteel@bellsouth.net www.pilingproducts.com

APPENDIX C-2

EXCAVATION OFFSET FROM PONTE 3-STORY STRUCTURE

Construction Induced Vibrations

Ground vibrations caused by construction equipment including excavators, trucks, rollers and pile drivers have a potential to cause damage to adjacent structures.

The Ponte 3-Story Building is of concern at the Site due to its age and deteriorated condition. The 35% Design of the practical limit of excavation is at an offset from the north face of the building. This practical excavation boundary is coincident with the north wall of the buried basement and existing longitudinal joint of the former one-story building floor slab. The offset also provides separation which allows for attenuation of construction-induced vibrations between the excavation face and the three-story building.

Structure-specific vibration criteria are typically established based on building type and condition, subsurface conditions, and environmental factors. A maximum peak particle velocity (PPV) is generally specified, however vibration frequency, displacement, and duration of vibrations will also be considered as the monitoring criteria for threshold vibration limits and settlement as criteria are developed in the 95% Design.

Numerous governmental agencies and academicians have studied and evaluated the effects of vibrations on buildings. A selection of the research excerpted from Reference 1 is presented below.

Table 1: Whiffen Vibration Criteria for Continuous Vibrations

PPV (in/sec)	Effect on Buildings
0.4–0.6	Architectural damage and possible minor structural damage
0.2	Threshold at which there is a risk of architectural damage to normal dwelling houses (houses with plastered walls and ceilings)
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibration to which ruins and ancient monuments should be subjected
0.006–0.019	Vibration unlikely to cause damage of any type

Table 2: Dowding Building Structure Vibration Criteria

Structure and Condition	Limiting PPV (in/sec)
Historic and some old buildings	0.5
Residential structures	0.5
New residential structures	1.0
Industrial buildings	2.0
Bridges	2.0

Table 3: AASHTO Maximum Vibration Levels for Preventing Damage

Type of Situation	Limiting Velocity (in/sec)
Historic sites or other critical locations	0.1
Residential buildings, plastered walls	0.2–0.3
Residential buildings in good repair with gypsum board walls	0.4–0.5
Engineered structures, without plaster	1.0–1.5

As can be seen in Tables 1, 2 and 3, the range of PPV varies based on the type of building and can range from as low as 0.08 in/sec for ruins and ancient monuments up to 2 in/sec for bridges. Preliminarily, an allowable PPV of 0.3 in/sec for steady state vibration has been identified by Golder Associates Inc. to be protective of the Ponte Equities Building. This value is the average of the PPV values for "Architectural damage and possible minor structural damage" and "Virtually no risk of architectural damage to normal buildings" presented by Table 1. The allowable PPV will be refined in the 95% Design.

As presented in the 35% Design Report, the practical limit of excavation has been established an off-set distance of approximately 35 feet from the Ponte Equities Building, see Figure 1. This off-set distance coincides with the north wall of the buried basement and existing longitudinal joint of the former one-story building floor slab. Disturbing the floor slab within the off-set area has the potential to result in damage to the Boiler House which sits on top of the slab. Due to settlement of fill and debris, voids have formed below the slab such that the slab is unsupported in many areas.

The offset distance of 35 feet is also based on consideration of attenuation of vibrations caused by equipment expected to be used during remediation, Figure 2, which presents a correlation between vibrations generated by various construction equipment and distance, can be used to approximate the potential impacts various equipment may have on the Pontes Equities Building. As indicated on Figure 1, at a distance of 35 feet a small dozer would generate a negligible PPV of about 0.002 in/sec. At the same distance a pavement breaker would generate a PPV of approximately 0.3 in/sec. However, a vibratory pile driver would generate a PPV of approximately 0.4 in/sec. Figure 1 suggests that a vibratory pile driver operating at a distance of 35 feet would generate vibrations that would exceed the selected PPV of 0.3 in/sec.

In the 35% Design, it is expected that sheeting will be needed to control groundwater drawdown caused by excavation dewatering with wells or well points needed to depressurize the Cape May formation and stabilize the excavation. Without sheeting, lowering the piezometric pressure by four feet as required for stabilizing certain excavation areas would increase the effective stress on the organic and compressible MMC soils. Based on typical compressibilities of organic silt and the interpolated thickness of the MMC beneath the Ponte Building, this could result in settlement beneath the Ponte Building of 1 to 2 inches. Therefore, the 35-foot offset provides protection against vibrations that would be caused by equipment to install sheeting to contain groundwater drawdown beneath the Ponte Building and reduce the quantity of water pumped requiring treatment and discharge.

This preliminary evaluation of vibrations will be advanced during the 95% Design when vibration criteria will be established along with vibration and monitoring programs to be implemented to monitor construction-induced vibrations and ground movements.

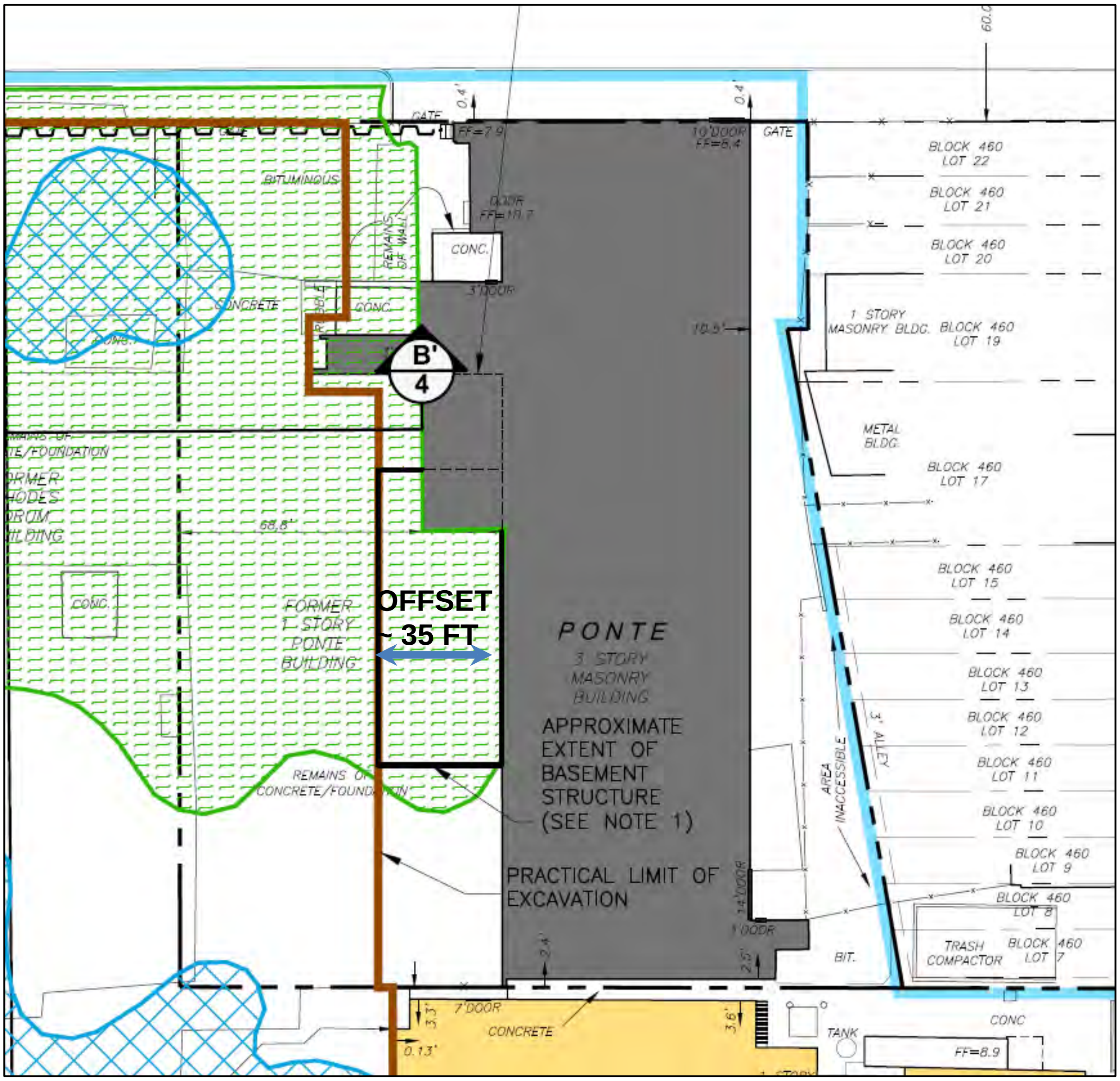


Figure 1: Offset to Practical Limit of Excavation from Ponte Equities Building

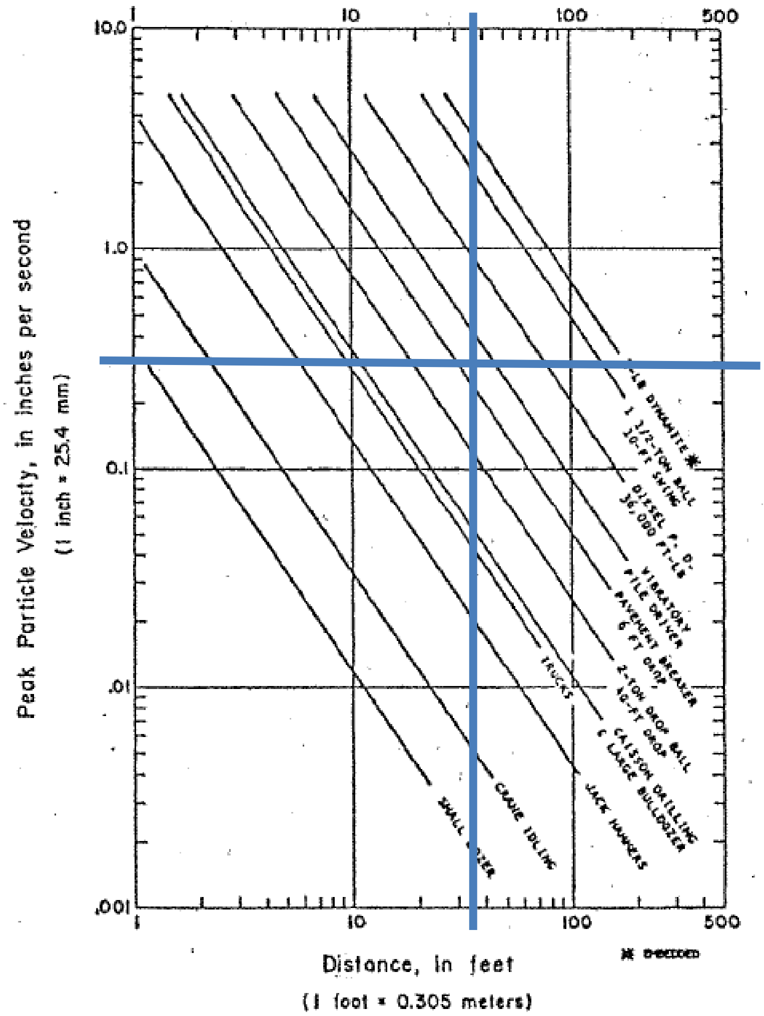


Figure 2: Relative Intensities of Construction Vibrations (Reference 2)

References

1. California Department of Transportation “Transportation- and Construction-Induced Vibration Guidance Manual”, June 2004.
2. Weiss, John F. “Construction Vibrations: State-of-the-Art” American Society of Civil Engineers <u>Journal of the Geotechnical Engineering Division</u> GT2 (1981) 167-181.

APPENDIX D

ARSENIC VOLUME AND MASS CALCULATIONS

CALCULATIONS

Date:	September 25, 2013	**Made by:** ASM
Project No.:	073-86114	**Checked by:** MB
Subject:	ARSENIC VOLUME AND MASS CALCULATIONS	**Reviewed by:** AH
Project Short Title:	**MA/REMEDIAL DESIGN/NJ**	

ARSENIC VOLUME AND MASS CALCULATIONS

A practical excavation boundary (Limit of Practical Excavation) was developed during the 35% Design to be protective of South 6th Street, underground and overhead utilities and the Ponte Equities Building. Along South 6th Street and north of the Pontes Equities Building the established Limit of Practical Excavation falls inside the Limits of Soil Remediation established in the ROD, see Figure 1. As a result, minimal amounts of Arsenic Source Material (White Material) and arsenic-containing MMC (MMC with arsenic > 300 ppm) will be left in-place in these two areas, see Figure 1.

The methods used to estimate the volume and mass of arsenic left in-place are described below:

- <u>South 6th Street</u> – Subsurface data was not collected below the sidewalk along South 6th Street due to the presence of underground and overhead utilities. Therefore, data collected from boreholes completed along the fenceline parallel to South 6th Street were extrapolated to the east under the sidewalk to provide a conservative volume estimate of arsenic-impacted materials left in-place. The thickness of White Material was estimated to be 2 feet and was extrapolated to the extent of the curb line on South 6th Street (approximately 12 feet). The thickness of arsenic-containing MMC was estimated to be 1-foot and was also extrapolated to the extent of the curb line on South 6th Street. This extrapolation is believed to be conservative based upon historical evidence that South 6th Street, including the embankment upon which the street was built, was present prior to historic tannery operations. As such, the layer of White Material, which has been assumed to extend below the sidewalk at the same thickness as found at the fenceline, more likely pinches out as it extends eastward under the sidewalk. Based upon this conservative extrapolation, it is estimated that approximately 175 cubic yards of White Material and 120 cubic yards of arsenic-containing MMC will be left in-place below the west sidewalk of South 6th Street.
- <u>Ponte Equities Building Area</u> – Subsurface data was collected in the area where source material will be left in-place adjacent to the three-story Ponte Equities Building (Drawings 3 and 7). Therefore, the volume of materials in this area was calculated based upon the extent and thickness observed in boreholes (not extrapolated) in this area. The areal extent of material that will be left in-place (approximately 4,560 square feet) along with the unit thicknesses determined from the 3-dimensional geologic model were used to calculate the volume of White Material and arsenic-containing MMC. Approximately 300 cubic yards of White Material and 130 cubic yards of arsenic-containing MMC will be left in-place in this area.

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The total volume of White Material and arsenic-containing MMC within the Limits of Soil Remediation is approximately 12,600 cubic yards. Therefore, approximately 5.4% of the total volume of arsenic-impacted materials must be left in-place because of the need to protect 6th Street, utilities and the Ponte Equities Building.

The mass of arsenic left in-place in each of the areas described above was also calculated using the volumes described above and applying the average concentration of arsenic detected greater than 300 mg/kg within each material type beneath the Site (i.e., White Material or arsenic-containing MMC). Based upon the collected Site data, the average arsenic concentration in White Material is 4,542 mg/kg (from 33 samples), and the average arsenic concentration in arsenic-containing MMC is 2,470 mg/kg (from 205 samples). An assumed unit weight of 90 pounds per cubic foot was used to convert volume to arsenic source mass for both White Material and arsenic-containing MMC. As a result, approximately 1.4 tons of arsenic is conservatively estimated to be left in-place along South 6th Street in both White Material and arsenic-containing MMC, and approximately 2.1 tons of arsenic will be left in-place adjacent to the three-story Ponte Equities Building in both White Material and arsenic-containing MMC. The total mass of arsenic in in both White Material and arsenic-containing MMC within the limits of remediation is estimated to be 64 tons; therefore, approximately 5% of the total source mass of arsenic will be left in-place within the Limits of Soil Remediation, and will be protected by the remedy cap and institutional controls.

Material volumes presented in Table 1 are based on assumed uniform material thicknesses with each area and are presented to illustrate the potential range of material volumes. The volumes presented in Table 1 do not take into consideration variations in material thickness predicted by the 3-dimensional model.

Table 1: Estimated Range of Volume of White Material and Arsenic-containing MMC left in-place below South 6th Street Sidewalk and adjacent to Ponte Equities Building

Location	Area	Estimated Range of White Material Thickness (feet)		Estimated Range of Volume of White Material (CY)		Estimated Range of Arsenic-containing MMC Thickness (feet)		Estimated Range of Volume of Arsenic-containing MMC (CY)	
Ponte	4,560	1.5	2	260	340	0.5	1	90	170
6th Street	3,120	1.5	2.5	180	290	0.5	1.5	60	180
Total				440	630			150	350

Notes:

1. Volumes presented do not account for variations in material thickness predicted by the 3-dimensional model.

The volumes presented in Table 2 consider material thicknesses and volumes developed using the 3-dimensional model and are the basis used to estimate the mass of arsenic left in-pace presented in Table 3.

Table 2: Estimated Volume of Arsenic Left In-place

Scenario	Total Volume to be Excavated (cubic yards)	Volume left in-place (cubic yards)	Total Impacted Volume (WM+MMC) (cubic yards)	Percent Volume left in-place (%)
MMC	3,600	250	13,325	1.9%
MMC - Ponte	-	130		1.0%
MMC - 6th St.	-	120		0.9%
White Material	9,000	475		3.6%
WM - Ponte	-	300		2.3%
WM - 6th St.	-	175		1.3%
Totals	12,600	725	13,325	5.4%

Table 3: Estimated Mass of Arsenic Left In-place

Scenario	Total Mass As to be Excavated (tons)	As Mass left in-place (tons)	Total As Mass (WM+MMC) (tons)	Percent As Mass left in-place (%)
MMC	11	0.8	64	1.2%
MMC - Ponte	-	0.4		0.6%
MMC - 6th St.	-	0.4		0.6%
White Material	50	2.6		4.1%
WM - Ponte	-	1.7		2.6%
WM - 6th St.	-	1.0		1.5%
Totals	61	3.5	64	5.3%

Notes:

1. Unit weight of arsenic-impacted materials assumed to be 90 pcf
2. Average arsenic concentration in MMC = 2,470 mg/kg
3. Average arsenic concentration in White Material = 4,452 mg/kg

Tables 4 and 5 present summaries of material volumes and arsenic mass by location.

Table 4: Estimated Volume of Arsenic Left In-place by Location

Scenario	6th Street	Ponte
Volume of MMC left in-place (cubic yards)	120	130
Volume of WM left in-place (cubic yards)	175	300
Total Volume left in-place (cubic yards)	295	430
Total Volume left in-place (cubic yards)	725	

Table 5: Estimated Mass of Arsenic Left In-place by Location

Scenario	6th Street	Ponte
Mass of MMC left in-place (tons)	0.4	0.4
Mass of WM left in-place (tons)	1.0	1.7
Total Mass left in-place (tons)	1.4	2.1
Total Mass left in-place (tons)	3.5	

Figures 1, 2 and 3 present the locations of the arsenic-impacted materials that will be left in-place below the South 6th Street sidewalk and adjacent to the Ponte Equities Building.

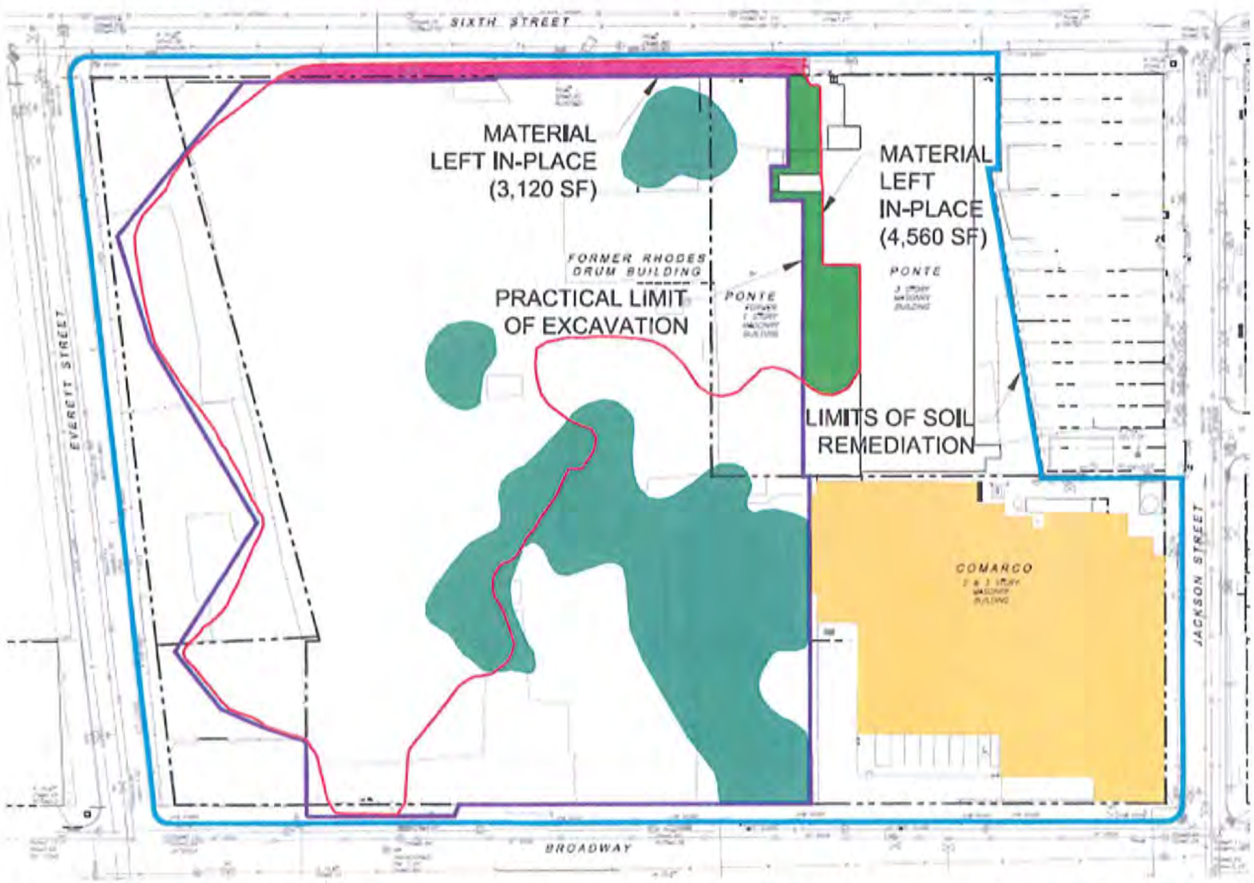

Figure 1: Plan view showing the locations of arsenic-impacted materials to be left in-place below the 6th Street sidewalk and adjacent to Ponte Equities 3-story building

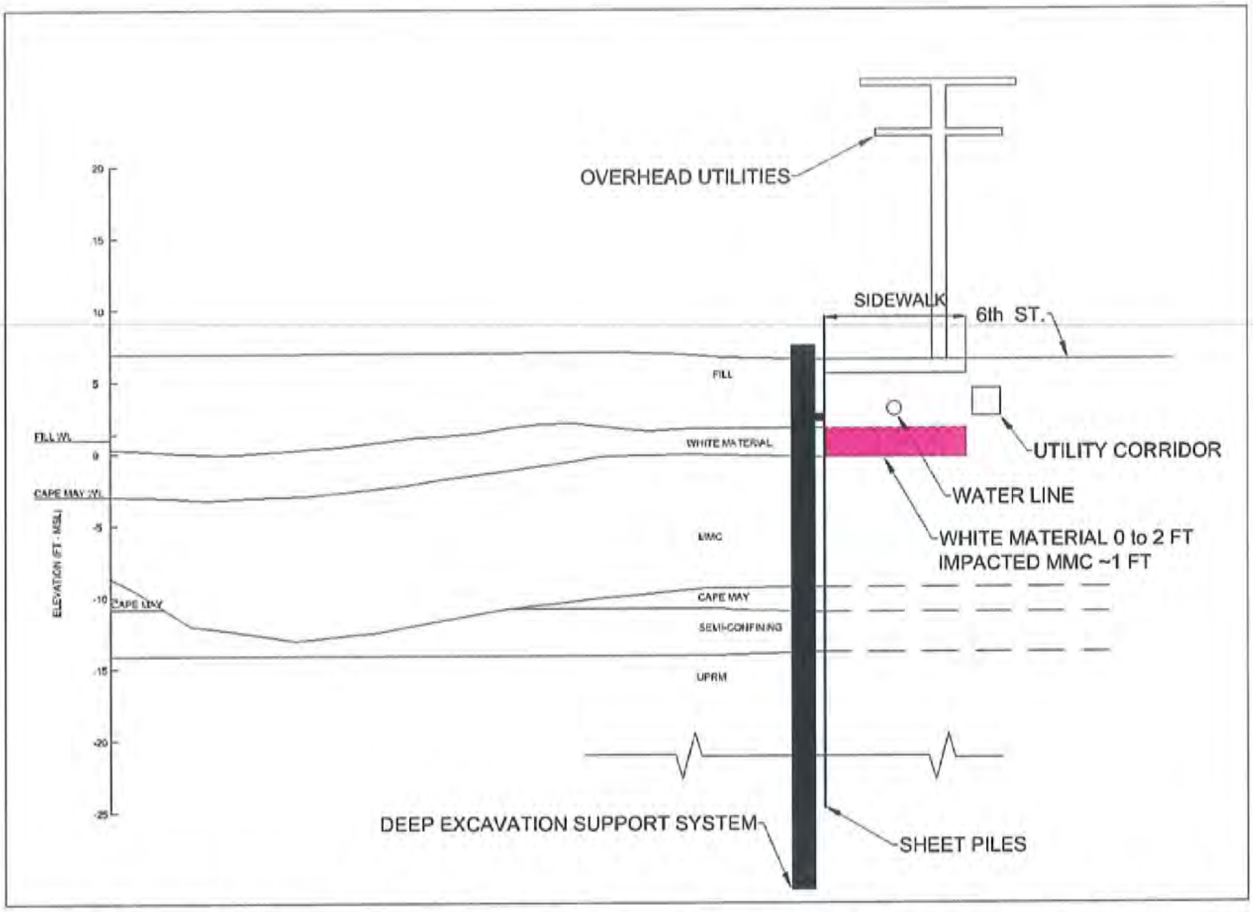

Figure 2: Section showing estimated extent of arsenic-impacted material left in-place below the South 6th Street sidewalk

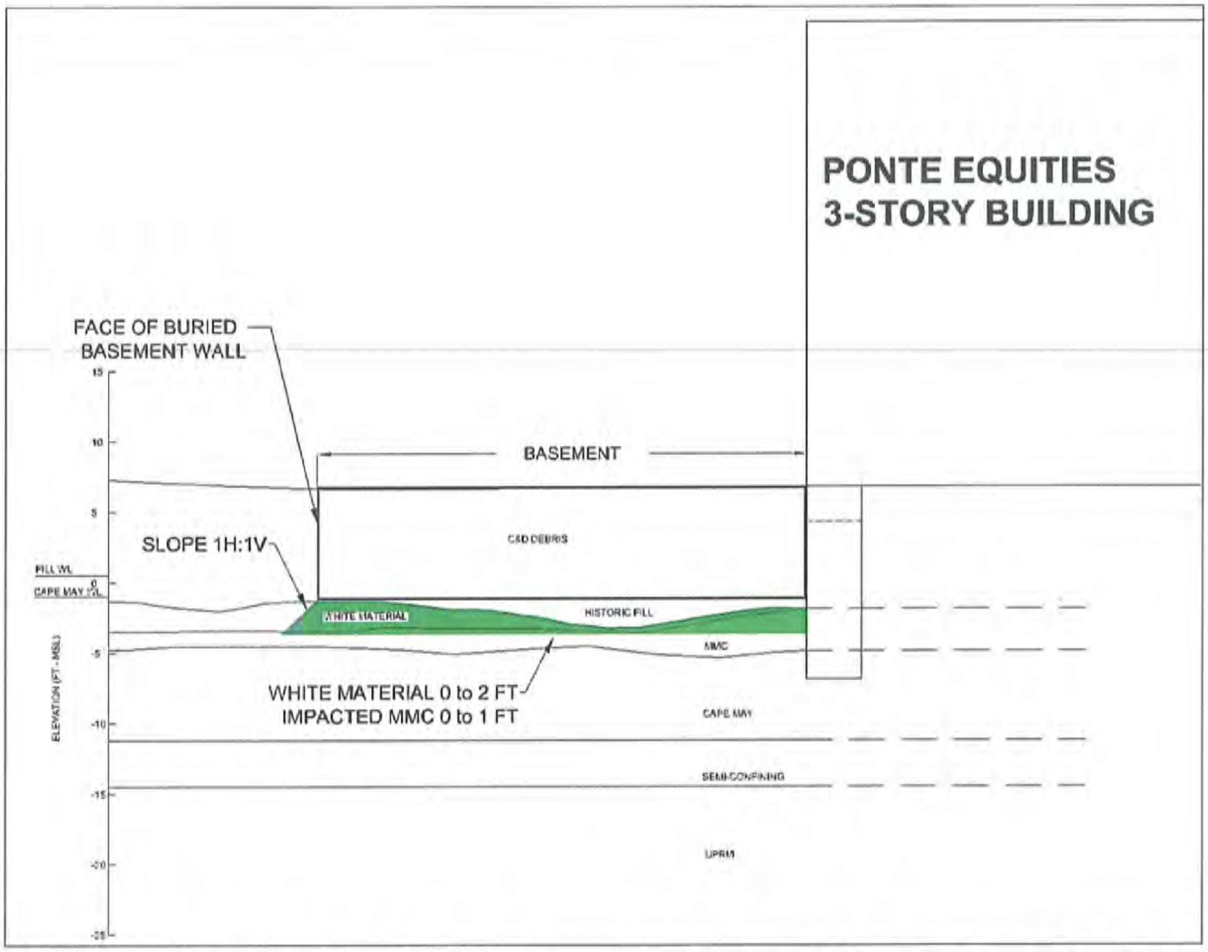

Figure 3: Section showing estimated extent of arsenic-impacted materials left in-place adjacent to Ponte Equities 3-story building

APPENDIX E

WHITE MATERIAL WASTE TREATABILITY TEST SUMMARY

TECHNICAL MEMORANDUM

Date: September 2013 **Project No.:** 073-8611413

To: United States Environmental Protection Agency (USEPA)

From: Golder Associates Inc.

cc: *de maximis*

RE: **TREATABILITY TESTING OF WHITE MATERIAL, MARTIN AARON SUPERFUND SITE, CAMDEN, NEW JERSEY**

1.0 INTRODUCTION

The purpose of this Technical Memorandum is to provide the United States Environmental Protection Agency (USEPA) with the results of an investigation to evaluate the treatability of White Material which will be encountered during remedial action at the Martin Aaron Superfund Site (Site). Specifically, this Technical Memorandum demonstrates that arsenic concentrations in the toxic characteristic leaching procedure (TCLP) extract of White Material can be reduced below the threshold for characteristically hazardous (RCRA Subtitle C) waste of 5 milligrams per liter (mg/L).

2.0 METHODOLOGY

2.1 Excavation

Excavations were performed between July 8th and July 10th, 2013, by Environmental Waste Minimization, Inc. (EWMI) of Northampton, Pennsylvania, utilizing a tracked excavator. Eight (8) test pits (GTP-3013 through GTP-3016 and ETP-3010 through ETP-3013) were performed under full-time observation by Golder Associates Inc. (Golder) personnel. The excavator bucket was decontaminated prior to excavation at each test pit location. The locations of the test pits are depicted on Figure 1. The locations were staked by Golder personnel and surveyed by Vargo Associates (Vargo) of Franklinville, New Jersey.

2.2 Sampling

A portable X-Ray Fluorescence (XRF) unit was used at the Site for screening of White Material to aid in the selection of samples with varying concentrations of total arsenic. Five samples were identified and sent to Lancaster Laboratories (Lancaster) of Lancaster, Pennsylvania, for determination of baseline total and TCLP arsenic concentrations, as well as moisture content. Four of these five samples of White Material were split and sent to Clean Earth of North Jersey, Inc., (CENJ) with one of the split samples also being sent to EWMI.

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3.0 TREATMENT

CENJ completed total and TCLP arsenic testing on the four samples to establish baseline arsenic concentrations. Subsequently, they blended White Material with cement kiln dust (CKD) at a rate of 15 and 30%. TCLP arsenic concentrations were determined after treatment and are summarized in Table 1.

EWMI obtained one sample of White Material and treated it with cement and other additives. Before and after treatment, the TCLP arsenic concentrations were measured and are also summarized below in Table 1.

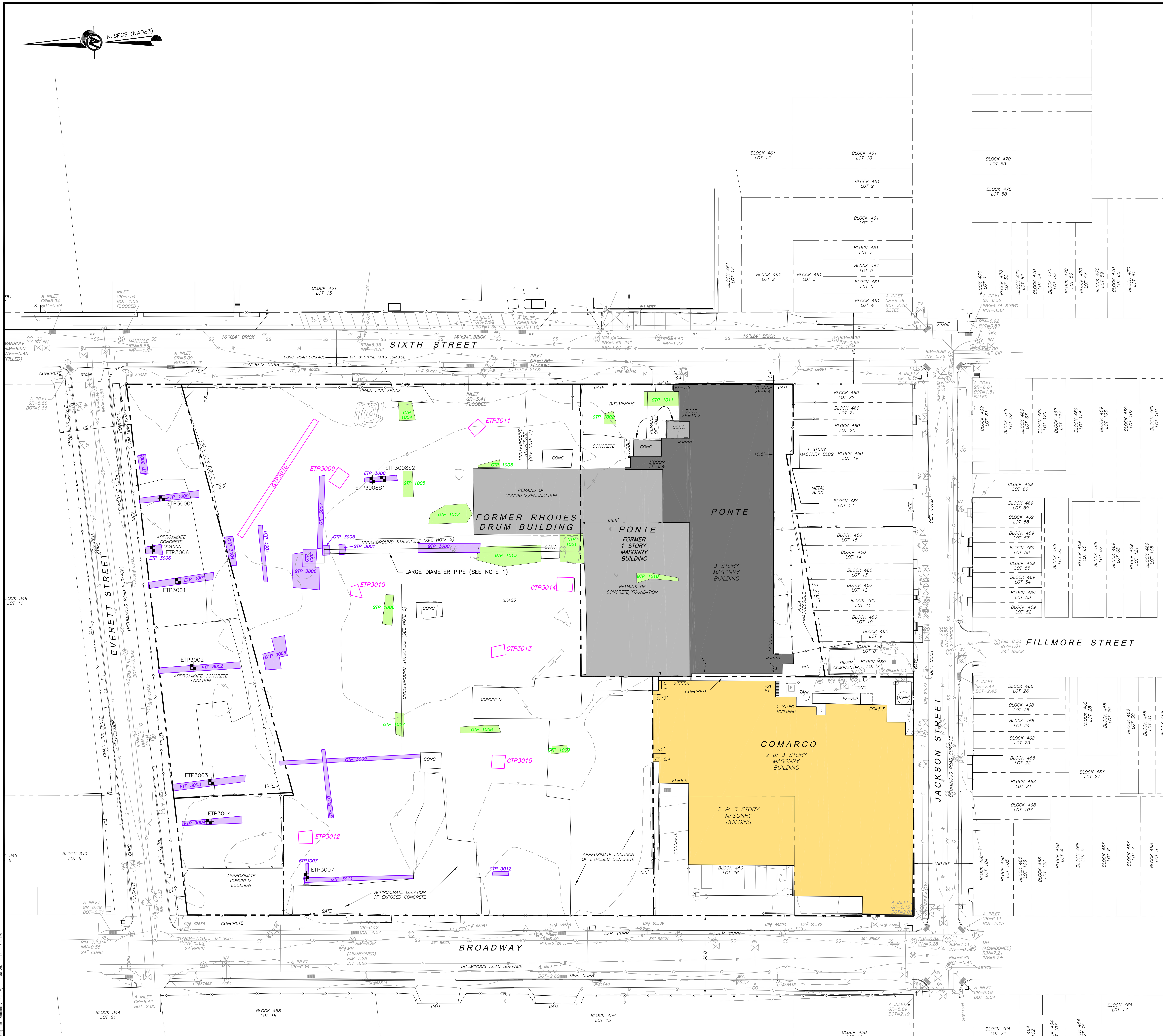
Table 1
White Material Treatability Testing
Summary of Results

		ETP-3009-8	ETP-3010-8	ETP-3011-8.5	ETP-3012-6	ETP-3012-7.5
GAI	XRF Total As (mg/kg)	4,755	2,792	11,240	6,759	11,328
Lancaster	Total As (mg/kg)	7,860	5,030	22,500	9,520	16,800
	TCLP As (mg/L)	0.176	0.155	119	31.9	17.1
	MC (%)	57.5	44.5	71.6	52.5	55.4
CENJ	Total As (mg/kg)	-	3,262	4,646	7,700	12,310
	TCLP As (mg/L)	-	0.14	60	20	12.6
	TCLP +15% CKD (mg/L)	-	0.15	1.6	1.1	1.6
	TCLP 30% CKD (mg/L)	-	0.14	0.82	1.0	0.2
EWMI	TCLP As (mg/L)	-	-	-	-	16.0
	TCLP treated (mg/L)	-	-	-	-	0.17

The analysis reports from Lancaster and CENJ are included in Attachment A.

4.0 CONCLUSIONS

The results of treatability study indicate that White Material can be effectively treated using CKD and cement with other additives. After treatment, the arsenic concentrations in the TCLP extract decreased to a range of 0.15 to 1.6 mg/L, well below the 5 mg/L regulatory limit of arsenic for land disposal. While other constituents were not analyzed as part of this study, it is believed that treating for arsenic will result in treatment of any other constituents to below the regulatory limit for land disposal.



LEGEND

- PROPERTY LINE
- ADJOINING PROPERTY LINE
- RAILROAD TRACK
- CHAIN LINK FENCE
- EXISTING CONTOUR
- SEWER/STORM SYSTEM
- COMMUNICATIONS LINE
- ELECTRIC LINE
- GAS LINE
- WATER LINE
- UNDERGROUND STRUCTURE (SEE NOTE 2)
- UTILITY POLE
- UTILITY POLE W/LIGHT
- GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- WATER MANHOLE
- INLET
- SEWER/STORM MANHOLE
- CLEAN OUT
- MANHOLE (USE UNKNOWN)
- COMMUNICATIONS MANHOLE
- ELECTRIC MANHOLE
- VALVE-USE UNKNOWN
- PDI STAGE I TEST PIT
- PDI STAGE II TEST PIT
- ETP3002 PDI STAGE II TEST PIT SOIL SAMPLE LOCATION
- TREATABILITY TEST PIT

NOTES

1.) LARGE DIAMETER PIPE LOCATION AND ALIGNMENT AS SHOWN BASED UPON ENCOUNTERING OF THE STRUCTURE WITHIN TEST PIT EXPLORATIONS.

2.) UNDERGROUND STRUCTURES REPRESENT LOCATIONS OF POSSIBLE UTILITIES LOCATED BY GEOPHYSICAL METHODS AND MARKED IN THE FIELD BY ADVANCED GEOLOGICAL SERVICES ON APRIL 21 AND APRIL 24, 2009, AND SURVEYED BY VARGO ASSOCIATES, INC.

REFERENCES

1.) BASE MAP FROM DIGITAL FILE 09056-06-10-13.dwg ENTITLED "MAP OF SURVEY BLOCK 460, LOTS 1, 2, 3, 4, 26, & 29 CITY OF CAMDEN, CAMDEN COUNTY, NEW JERSEY, REVISED ON JULY 28, 2009, PREPARED BY VARGO ASSOCIATES. PDI SOIL SAMPLE LOCATION SHOWN FOR ETP3001 HAS BEEN ADJUSTED FROM THE LOCATION PROVIDED IN THE ABOVE REFERENCED SURVEY, BASED UPON GOLDER FIELD PERSONNEL OBSERVATIONS AND SUBSEQUENT MEASUREMENTS. TREATABILITY TEST PIT LOCATIONS FROM FILE "TEST PITS-071213.DWG" PROVIDED BY VARGO ASSOCIATES ON JULY 15, 2013.

SCALE 30 0 30 60 FEET

REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK	RVW

PROJECT
MARTIN AARON SUPERFUND SITE
PRE-DESIGN INVESTIGATION - OPERABLE UNIT 1
CAMDEN, NEW JERSEY

TITLE
TEST PIT AND TREATABILITY TEST PIT LOCATIONS

Golder Associates
Mt. Laurel, New Jersey
NJ Authorization #24GA28029100

PROJECT No.		073-86114
DESIGN	MTW	07/17/13
CADD	MJS	07/17/13
CHECK		
REVIEW		

FILE No. 07386114B099
SCALE AS SHOWN REV. 0

FIGURE 1

ATTACHMENT A

ANALYSIS REPORTS

CLEANEARTH

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Martin-Aaron Treatability Study

July 17-19, 2013

Sample	Total As (mg/Kg)	TCLP As (mg/L)
ETP 3011	4646	60
ETP 3011 + 15% CKD		1.6
ETP 3011 + 30% CKD		0.82
ETP 3012-7.5	12310	12.6
ETP 3012-7.5 + 15% CKD		1.6
ETP 3012-7.5 + 30% CKD		0.2
ETP 3010-8	3262	0.14
ETP 3010-8 + 15% CKD		0.15
ETP 3010-8 + 30% CKD		0.14
ETP 3012-6	7700	20
ETP 3012-6 + 15% CKD		1.1
ETP 3012-6 + 30% CKD		1.0

Note: The results provided here were solely intended for use to determine waste treatability for the purposes of pricing and are not intended for use as certified analysis for the basis of a waste determination or compliance with a specific environmental standard.

Karl Hartzell

Laboratory Manager

Martin-Aaron Treatment Study
July 17-19, 2013

		Total As (mg/L)	TCLP As (mg/L)		
Sample ID	**Color**	**Raw Sample**	**Raw Sample**	**+15% ckd**	**+30%ckd**
ETP 3011	grey	4646	60	1.6	0.82
ETP 3012-7.5	brown	12,310	12.6	1.6	0.2
ETP3010-8	white	3262	0.14	0.15	0.14
ETP 3012-6	brown	7700	20	1.11	1

ANALYTICAL RESULTS

Prepared by:	Prepared for:
Eurofins Lancaster Laboratories Environmental 2425 New Holland Pike Lancaster, PA 17601	Golder Associates Incorporated 200 Century Parkway Suite C Mt. Laurel NJ 08054

July 25, 2013

Project: Martin Aaron

Submittal Date: 07/12/2013
Group Number: 1403766
PO Number: PROJECT: 073-8611410
State of Sample Origin: NJ

Client Sample Description	Lancaster Labs (LL) #
ETP 3009-8 Grab Soil	7125913
ETP 3009-8 Grab Soil	7125914
ETP 3011-8.5 Grab Soil	7125915
ETP 3011-8.5 Grab Soil	7125916
ETP 3010-8 Grab Soil	7125917
ETP 3010-8 Grab Soil	7125918
ETP 3012-6 Grab Soil	7125919
ETP 3012-6 Grab Soil	7125920
ETP 3012-7.5 Grab Soil	7125921
ETP 3012-7.5 Grab Soil	7125922
ETP 3012-6FD Grab Soil	7125923
ETP 3012-6FD Grab Soil	7125924

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO	Golder Associates Incorporated	Attn: Cindi Lucas-Youmans
ELECTRONIC COPY TO	DDMS	Attn: Mark Kill
ELECTRONIC COPY TO	ddms	Attn: Polly Newbold
ELECTRONIC COPY TO	ddms	Attn: Brooke Roecker
ELECTRONIC COPY TO	Golder Associates Incorporated	Attn: Alison Zoll
ELECTRONIC COPY TO	DDMS	Attn: Sarah Wright
ELECTRONIC	DDMS	Attn: Rachel Maddaluna

COPY TO

Respectfully Submitted,

Amek Carter

Amek Carter
Specialist

(717) 556-7252

Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Sample Description: ETP 3009-8 Grab Soil
Martin Aaron

LL Sample # SW 7125913
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 09:15 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic		7440-38-2	7,860	8.15	23.3	5
Wet Chemistry		**SM 2540 G-1997**		%	%	%	
00111	Moisture		n.a.	57.5	0.50	0.50	1
	Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 04:51	Tara L Snyder	5
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3009-8 Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125914
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 09:15 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/l	mg/l	mg/l	
07035	Arsenic		7440-38-2	0.176	0.0068	0.0200	1

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131965705004	07/17/2013 07:36	Joanne M Gates	1
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131965705004	07/16/2013 23:30	Annamaria Stipkovits	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947C	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

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Analysis Report

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Sample Description: ETP 3011-8.5 Grab Soil
Martin Aaron

LL Sample # SW 7125915
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 11:25 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name	CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals	**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic	7440-38-2	22,500	23.9	68.4	10
Wet Chemistry	**SM 2540 G-1997**		%	%	%	
00111	Moisture	n.a.	71.6	0.50	0.50	1
	Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.					

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 04:55	Tara L Snyder	10
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3011-8.5 Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125916
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 11:25 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/l	mg/l	mg/l	
07035	Arsenic		7440-38-2	119	0.136	0.400	20

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131965705004	07/17/2013 14:41	Eric L Eby	20
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131965705004	07/16/2013 23:30	Annamaria Stipkovits	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947C	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

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Analysis Report

2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300 • Fax: 717-656-2681 • www.LancasterLabs.com

Sample Description: ETP 3010-8 Grab Soil
Martin Aaron

LL Sample # SW 7125917
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/10/2013 09:55 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic		7440-38-2	5,030	6.24	17.8	5
Wet Chemistry		**SM 2540 G-1997**		%	%	%	
00111	Moisture		n.a.	44.5	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 05:07	Tara L Snyder	5
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3010-8 Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125918
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/10/2013 09:55 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/l	mg/l	mg/l	
07035	Arsenic		7440-38-2	0.155	0.0068	0.0200	1

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131985705001	07/17/2013 20:20	John P Hook	1
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131985705001	07/17/2013 10:30	James L Mertz	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947A	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3012-6 Grab Soil
Martin Aaron

LL Sample # SW 7125919
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:50 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic		7440-38-2	9,520	14.7	42.1	10
Wet Chemistry		**SM 2540 G-1997**		%	%	%	
00111	Moisture		n.a.	52.5	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 05:11	Tara L Snyder	10
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

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Sample Description: ETP 3012-6 Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125920
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:50 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/l	mg/l	mg/l	
07035	Arsenic		7440-38-2	31.9	0.0340	0.100	5

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131965705004	07/17/2013 14:45	Eric L Eby	5
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131965705004	07/16/2013 23:30	Annamaria Stipkovits	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947C	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3012-7.5 Grab Soil
Martin Aaron

LL Sample # SW 7125921
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:55 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic		7440-38-2	16,800	15.7	44.8	10
Wet Chemistry		**SM 2540 G-1997**		%	%	%	
00111	Moisture		n.a.	55.4	0.50	0.50	1
	Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.						

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 05:15	Tara L Snyder	10
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3012-7.5 Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125922
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:55 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
07035	Arsenic		7440-38-2	17.1	0.0340	0.100	5

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131965705004	07/17/2013 14:49	Eric L Eby	5
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131965705004	07/16/2013 23:30	Annamaria Stipkovits	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947C	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

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Analysis Report

Sample Description: ETP 3012-6FD Grab Soil
Martin Aaron

LL Sample # SW 7125923
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:50 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	Dry Result	Dry Method Detection Limit*	Dry Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		mg/kg	mg/kg	mg/kg	
06935	Arsenic		7440-38-2	10,800	14.1	40.2	10
Wet Chemistry		**SM 2540 G-1997**		%	%	%	
00111	Moisture		n.a.	50.8	0.50	0.50	1

Moisture represents the loss in weight of the sample after oven drying at 103 - 105 degrees Celsius. The moisture result reported is on an as-received basis.

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
06935	Arsenic	SW-846 6010B	1	131975708002	07/18/2013 05:19	Tara L Snyder	10
05708	SW SW846 ICP/ICP MS Digest	SW-846 3050B	1	131975708002	07/16/2013 21:40	Annamaria Stipkovits	1
00111	Moisture	SM 2540 G-1997	1	13198820002B	07/17/2013 22:21	Scott W Freisher	1

*=This limit was used in the evaluation of the final result

Sample Description: ETP 3012-6FD Grab Soil
NVE
Martin Aaron

LL Sample # TL 7125924
LL Group # 1403766
Account # 05667

Project Name: Martin Aaron

Collected: 07/09/2013 14:50 by MW

Submitted: 07/12/2013 15:35
Reported: 07/25/2013 13:37

Golder Associates Incorporated
200 Century Parkway
Suite C
Mt. Laurel NJ 08054

CAT No.	Analysis Name		CAS Number	As Received Result	As Received Method Detection Limit*	As Received Limit of Quantitation	Dilution Factor
Metals		**SW-846 6010B**		**mg/l**	**mg/l**	**mg/l**	
07035	Arsenic		7440-38-2	32.6	0.0340	0.100	5

General Sample Comments

State of New Jersey Lab Certification No. PA011
The temperature of the temperature blank bottle(s) upon receipt at the lab was 6.7C using a Hg thermometer. The sample bottles were then measured using an IR thermometer and were recorded at 6.1-6.8 C.

If the analysis is for determination of Hazardous Waste Characteristics, see Table 1 in EPA Code of Federal Regulations 40 CFR 261.24.

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
07035	Arsenic	SW-846 6010B	1	131965705004	07/17/2013 14:53	Eric L Eby	5
05705	WW/TL SW 846 ICP Digest (tot)	SW-846 3010A	1	131965705004	07/16/2013 23:30	Annamaria Stipkovits	1
00947	TCLP Non-volatile Extraction	SW-846 1311	1	13196-482-0947C	07/15/2013 13:25	Darin P Wagner	n.a.

*=This limit was used in the evaluation of the final result

Quality Control Summary

Client Name: Golder Associates Incorporated   Group Number: 1403766
Reported: 07/25/13 at 01:37 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Laboratory Compliance Quality Control

Analysis Name	Blank Result	Blank MDL**	Blank LOQ	Report Units	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 131965705004	Sample number(s): 7125914,7125916,7125920,7125922,7125924								
Arsenic	N.D.	0.0068	0.0200	mg/l	119		80-120		
Batch number: 131975708002	Sample number(s): 7125913,7125915,7125917,7125919,7125921,7125923								
Arsenic	N.D.	0.700	2.00	mg/kg	97		80-120		
Batch number: 131985705001	Sample number(s): 7125918								
Arsenic	N.D.	0.0068	0.0200	mg/l	114		80-120		
Batch number: 13198820002B	Sample number(s): 7125913,7125915,7125917,7125919,7125921,7125923								
Moisture					100		99-101		

Sample Matrix Quality Control

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike
Background (BKG) = the sample used in conjunction with the duplicate

Analysis Name	MS %REC	MSD %REC	MS/MSD Limits	RPD	RPD MAX	BKG Conc	DUP Conc	DUP RPD	Dup RPD Max
Batch number: 131965705004	Sample number(s): 7125914,7125916,7125920,7125922,7125924 UNSPK: P126150 BKG: P126150								
Arsenic	100	100	75-125	0	20	0.0305	0.0316	3 (1)	20
Batch number: 131975708002	Sample number(s): 7125913,7125915,7125917,7125919,7125921,7125923 UNSPK: P127361 BKG: P127361								
Arsenic	104	104	75-125	0	20	3.73	3.72	0 (1)	20
Batch number: 131985705001	Sample number(s): 7125918 UNSPK: P125672 BKG: P125672								
Arsenic	97	98	75-125	1	20	0.0150 J	0.0078 J	63* (1)	20
Batch number: 13198820002B	Sample number(s): 7125913,7125915,7125917,7125919,7125921,7125923 BKG: P125897								
Moisture						19.4	19.3	1	5

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.

Environmental Analysis Request/Chain of Custody

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Acct. # 5667 For Eurofins Lancaster Laboratories use only Group # 1403766 Sample # 7125913-24

Instructions on reverse side correspond with circled numbers.

COC # 332679

① **Client Information**

Client: Golder Associates	Acct. #:
Project Name/#: Martin Aaron	PWSID #:
Project Manager: Alison Zoll	P.O. #:
Sampler: Michael Wexler	Quote #:
Name of state where samples were collected: NJ	

④ **Matrix**: Sediment, Ground, Surface, Potable, NPDES, Soil, Water, Other:

⑤ **Analysis Requested** — Preservation Codes

For Lab Use Only
FSC:
SCR#: 141775

Preservation Codes
H=HCl T=Thiosulfate
N=HNO_3 B=NaOH
S=H_2SO_4 O=Other

② ③ ⑥

Sample Identification	Collected Date	Collected Time	Grab	Composite	Soil	Water	Other	Total # of Containers	Moisture	TCLP As	Total As	Remarks
ETP 3009-8	7/9	0915	✓		X			1	~~X~~	~~X~~	~~X~~	No analysis
ETP 3011-8.5	7/9	1125	✓		X			1	X	X	X	
ETP 3010-8	7/10	0955	✓		X			1	X	X	X	
ETP 3012-6	7/9	1450	✓		X			1	X	X	X	
ETP 3012-7.5	7/9	1465	✓		X			1	X	X	X	
ETP 3012-~~7.5~~ FD *6	7/9	~~1455~~ 1450	✓		X			1	X	X	X	*corrected sample ID per Alison Z. AC 7/15/13

⑦ **Turnaround Time (TAT) Requested** (please circle)
Standard (circled) Rush
(Rush TAT is subject to Lancaster Laboratories approval and surcharge.)

Date results are needed: ______

E-mail address: ______

⑧ **Data Package Options** (circle if required)

Type I (Validation/non-CLP) Type VI (Raw Data Only)
Type III (Reduced non-CLP) TX TRRP-13
Type IV (CLP SOW) MA MCP CT RCP

⑨

Relinquished by	Date	Time	Received by	Date	Time
Bottle Storage					
Alison Zoll	7/12/13	13:20	Bill DeLong	7-12-13	13:20
Bill DeLong	7-12-13	15:35			
			[illegible]	7/12/13	1535

EDD Required? Yes No
If yes, format: ______

Site-Specific QC (MS/MSD/Dup)? Yes No
(If yes, indicate QC sample and submit triplicate sample volume.)

Relinquished by Commercial Carrier:
UPS ____ FedEx ____ Other ____

Temperature upon receipt 6.1-6.8 °C

Eurofins Lancaster Laboratories, Inc. • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300
The white copy should accompany samples to Eurofins Lancaster Laboratories. The yellow copy should be retained by the client.

Issued by Dept. 40 Management
7044.02

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Environmental Sample Administration Receipt Documentation Log

1463766

Client/Project: Golder Associates

Date of Receipt: 7/12/13

Time of Receipt: 1535

Source Code: 01

Shipping Container Sealed: YES NO

Custody Seal Present * : YES NO

* Custody seal was intact unless otherwise noted in the discrepancy section

Package: Chilled Not Chilled

Temperature of Shipping Containers							
Cooler #	Thermometer ID	Temperature (°C)	Temp Bottle (TB) or Surface Temp (ST)	Wet Ice (WI) or Dry Ice (DI) or Ice Packs (IP)	Ice Present? Y/N	Loose (L) Bagged Ice (B) or NA	Comments
1	DT121 1396	6.7°	TB ST	WI	Y	B	6.8° 6.4° 6.2° 6.1° 6.2°
2							
3							
4							
5							
6							

Number of Trip Blanks received NOT listed on chain of custody: 0

Paperwork Discrepancy/Unpacking Problems:

ETP 3010-8 time=935

did not receive a sample labeled ETP 3012-7.5 FD but did receive

a sample labeled ETP 3012-6 FD 7/9/13 1450

Unpacker Signature/Emp#: 2308 **Date/Time:** 7/12/13 1621

Issued by Dept. 6042 Management

2174.06

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	**BMQL**	Below Minimum Quantitation Level
N.D.	none detected	**MPN**	Most Probable Number
TNTC	Too Numerous To Count	**CP Units**	cobalt-chloroplatinate units
IU	International Units	**NTU**	nephelometric turbidity units
umhos/cm	micromhos/cm	**ng**	nanogram(s)
C	degrees Celsius	**F**	degrees Fahrenheit
meq	milliequivalents	**lb.**	pound(s)
g	gram(s)	**kg**	kilogram(s)
µg	microgram(s)	**mg**	milligram(s)
mL	milliliter(s)	**L**	liter(s)
m3	cubic meter(s)	**µL**	microliter(s)
		pg/L	picogram/liter

< less than - The number following the sign is the <u>limit of quantitation</u>, the smallest amount of analyte which can be reliably determined using this specific test.

> greater than

ppm parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.

ppb parts per billion

Dry weight basis Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Data Qualifiers:

C – result confirmed by reanalysis.

J - estimated value – The result is ≥ the Method Detection Limit (MDL) and < the Limit of Quantitation (LOQ).

U.S. EPA CLP Data Qualifiers:

	Organic Qualifiers		**Inorganic Qualifiers**
A	TIC is a possible aldol-condensation product	**B**	Value is <CRDL, but ≥IDL
B	Analyte was also detected in the blank	**E**	Estimated due to interference
C	Pesticide result confirmed by GC/MS	**M**	Duplicate injection precision not met
D	Compound quantitated on a diluted sample	**N**	Spike sample not within control limits
E	Concentration exceeds the calibration range of the instrument	**S**	Method of standard additions (MSA) used for calculation
N	Presumptive evidence of a compound (TICs only)	**U**	Compound was not detected
P	Concentration difference between primary and confirmation columns >25%	**W**	Post digestion spike out of control limits
		*****	Duplicate analysis not within control limits
U	Compound was not detected	**+**	Correlation coefficient for MSA <0.995
X,Y,Z	Defined in case narrative		

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as "analyze immediately" are not performed within 15 minutes.

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APPENDIX F

CCMUA AND CITY OF CAMDEN EFFLUENT LIMITS

Effluent Discharge Limits for City of Camden and Camden County Municipal Authority

Parameter	units	Camden Sewer	CCMUA
VOCs:			
BTEX	ug/l	-	1500
TTO (VOCs only)	ug/l	-	5000
Inorganics:			
Arsenic	mg/l	0.005	1
Beryllium	mg/l	-	Monitor
Boron	mg/l	0.5	-
Cadmium	mg/l	1	0.04
Chromium, hexavalent	mg/l	0.5	-
Chromium, total	mg/l	-	2
Copper	mg/l	1	1
Cyanide, total	mg/l	0.005	1
Cyanide, amenable	mg/l	-	1
Cyanides in waste	mg/l	2	-
Iron	mg/l	5	-
Lead	mg/l	0.5	0.3
Mercury	mg/l	0.005	0.01
Nickel	mg/l	1	1
Silver	mg/l	0.5	Monitor
Tin	mg/l	5	-
Zinc	mg/l	5	4
Molybdenum	mg/l		Monitor
NAPs/Other:			
Oxidation-Reduction Potential	mV	-	< -50
pH	su	6-9	6-11.5
Temperature	deg C	0-65	-
BOD	mg/l	1200	1000
Oil and Grease	mg/l	500	100
Phenol	mg/l	-	Monitor
Phenols	mg/l	0.005	-
TSS	mg/l	1500	750
Color	CU	-	Monitor
Hydrogen (gas)	mg/l	10	-
Sulphide (gas)	mg/l	10	-

Parameter	units	Camden Sewer	CCMUA
Sulpher dioxide (gas)	mg/l	10	-
Nitrous oxide (gas)	mg/l	10	-
Flow		-	Monitor
COD	mg/l	-	1000
Sulfide	mg/l	-	1
Petroleum Hydrocarbons	mg/l	-	30
TDS	mg/l	-	Monitor

Sources:

1. City of Camden, Chapter 465. Sewers (Amended 8-13-1981 by Ord. No. MC-1766. Values are 24-hour average.
2. CCMUA, May 2010 Stream Lining - Table 1 Specific Pollutants Maximum Daily Discharge Limitations

APPENDIX G

PRELIMINARY LIST OF TECHNICAL SPECIFICATIONS

MARTIN AARON
PRELIMINARY TECHNICAL SPECIFICATIONS FOR CONSTRUCTION OF PHASE 1 REMEDIAL ACTION DESIGN

TABLE OF CONTENTS

DIVISION 3 – CONCRETE

03100 - Concrete Formwork
03200 - Concrete Reinforcement
03300 - Cast-in-Place Concrete

DIVISION 4 – MASONRY

Not used.

DIVISION 5 – METALS

Not used.

DIVISION 6 – WOOD AND PLASTICS

Not used.

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

Not used.

DIVISION 8 – DOORS AND WINDOWS

Not used.

DIVISION 9 – FINISHES

Not used.

DIVISION 10 – SPECIALTIES

Not used.

DIVISION 11 – EQUIPMENT

Not used.

DIVISION 12 – FURNISHINGS

Not used.

DIVISION 13 – SPECIAL CONSTRUCTION

Not used.

DIVISION 14 – CONVEYING STRUCTURES

Not used.

DIVISION 15 – MECHANICAL

Not used.

DIVISION 16 – ELECTRICAL

Not used.